NATIONAL ACTION PLAN (NAP)

FOR THE IMPLEMENTATION OF THE LBS PROTOCOL AND ITS REGIONAL PLANS IN THE FRAMEWORK OF THE SAP-MED WITH THE AIM TO ACHIEVE GOOD ENVIRONMENTAL STATUS FOR POLLUTION-RELATED ECAP ECOLOGICAL OBJECTIVES
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01 Preface
1. Preface

The National Action Plan (NAP) for the implementation of the LBS Protocol and its Regional Plans in the framework of the SAP/MED with the aim to achieve good environmental status for pollution-related EcAp ecological objectives constitutes a review of the National Action Plan against pollution from land-based sources which was developed in the framework of SAP/MED implementation in 2005.

The legal basis for NAP update is provided in: the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, as amended in 1995 - Barcelona Convention 4 related protocols that are ratified in Montenegro by the Law on ratification of the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean; Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea; Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities; Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean; Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (Official Gazette of Montenegro 64/07 of 22/10/2007), as well as in the Protocol on Integrated Coastal Zone Management (ICZM), ratified by Montenegro in 2011. The Dumping Protocol and the Offshore Protocol are still pending ratification in Montenegro. The legal basis is also provided in the obligations arising from SAP/MED and Regional Plans and decisions of the Contracting Parties to the Barcelona Convention on EcAp implementation. Apart of the Barcelona Convention related basis, NAP update is based on the provisions of relevant national enacting legal acts which regulate protection of the coastal and marine environment, sustainable use of natural resources in coastal area and integrated coastal zone management.

The updated NAP takes into account related National inventories of pollutant emissions from land-based sources on the Montenegrin coast - National Budget Baselines (NBBs) that were prepared in 2004 and 2008 in accordance with LBS Protocol requirements, as well as the most recently developed NBB from July 2013/ November 2015. The aim of NAP development/update is to provide improved and updated policy framework for marine pollution prevention and control, thus contributing to the implementation of national ICZM policies and sustainable development policy (SDP). The 2015 National Strategy for Integrated Coastal Zone Management set out the obligation to update and develop the NAP.

In order to meet the obligations deriving from the LBS Protocol and the SAP/MED and Regional Plans in the context of achieving the ecological objectives EO5 (eutrophication), EO9 (contaminants) and EO10 (marine litter) the National Action Plan (NAP) sets out the operational targets and related measures for the prevention and/or reduction of marine pollution from land-based sources in the time frame of its implementation, from 2015 to 2025. In this regard, the following are provided: an overview of the institutional and legislative framework which is relevant for the fulfilment of priority objectives and measures implementation, entities
in charge of implementing measures, time schedule for implementation of measures, indicators for monitoring the implementation of measures, and an assessment of the financial resources necessary for the effective implementation of measures.

At the same time, the updated NAP gives an assessment of progress made in implementing the 2005 NAP measures through the mid-term evaluation of the situation (midterm baseline) of the coastal area and coastal waters which is under the influence of anthropogenic pollution pressures from land-based sources.

The updated NAP also contains a proposal of priority investment projects, needs in terms of capacity building, and a plan for monitoring and reporting on the fulfilment of objectives and implementation of set measures.

The NAP also includes an evaluation of the "hot-spot" status in accordance with the recommendations laid down for the NAP updates (UNEP (DEPI)/MED WG.414/3).

We owe our gratitude for the development of the updated NAP to the lead expert Ms. Ana Mišurović, and to the representatives of the Ministry of Sustainable Development and Tourism and of the Environmental Protection Agency: Ms. Jelena Knežević, MAP Focal Point, process coordinator, Ms. Milena Bataković, SPA/RAC Focal Point, Ms. Ivana Bulatović, MEDPOL Focal Point and Ms Snežana Didanović, who lead task force groups responsible for expert support for issues related to each of ecological objectives respectively. We owe special gratitude to Mr. Pavle Đurašković, MEDPOL expert advisor, representative of the Institute for Hydrometeorology and Seismology of Montenegro, lead expert for development of the 2005 NAP and the 2004, 2008, and 2013/2015 NBBs. We are also grateful to dr Viktor Simončič who facilitated NAP development process owing to his expert advice, and Ms Aneta Milutinović, representative of the Ministry of Sustainable Development and Tourism who supported the work of the National Steering Committee. We owe special gratitude to MEDPOL expert team composed of: Ms Tatjana Hema, MEDPOL Programme Officer and MEDPOL experts: Ms Marina Marković, Ms Susanna Casanovas, Mr Mohammed Kayyal and Ms Lihie Luclea.
Executive Summary
2. Executive Summary

SAP-MED commitments and the Regional Plans/Decisions for each ecological objective contribute to the fulfilment of all related EcAp GES targets. The NAP's gap analysis and programme of measures provide national responses to statutory obligations arising from EcAp implementation, but also contribute to IMAP introduction into the national programme for monitoring and reporting on the status of marine environment.

2.1 NAP Legal Basis

As indicated above, the legal basis for NAP update is provided in the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, as amended in 1995 - Barcelona Convention and its 5 protocols that are ratified by Montenegro. Article 15 of the LBS Protocol is the basis for legally binding obligations arising from SAP/MED and Regional Plans. They are further elaborated through a number of decisions of the Contracting Parties to the Barcelona Convention. The decisions in question are as follows:

- Strategic Action Programme (SAP-MED), 1997;
- Decision IG.19/7 “Regional Plan on the Reduction of BOD5 from Urban Wastewater”;
- Decision IG.19/8 “Regional Plan on the Elimination of Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Mirex and Toxaphene”;
- Decision IG.19/9 “Regional Plan on the Phasing Out of DDT”;
- Decision IG.20/8.1 “Regional Plan on the Reduction of Inputs of Mercury”;
- Decision IG.20/8.2 “Regional Plan on the Reduction of BOD5 in the food sector”;
- Decision IG.20/8.3.1 “Regional Plan on the Elimination of Alpha hexachlorocyclohexane; Beta hexachlorocyclohexane; Hexabromobiphenyl; Chlordecone; Pentachlorobenzene; Tetrabromodiphenyl ether and Pentabromodiphenyl ether; Hexabromodiphenyl ether and Heptabromodiphenyl ether; Lindane; Endosulfan, Perfluorooctane sulfonic acid, its salts and perfluorooxycotane sulfonyl fluoride”;
- Decision IG.20/8.3.2 “Regional Plan on the Phasing out of Lindane and Endosulfan”;
- Decision IG.20/8.3.3 “Regional Plan on the Phasing out of Perfluorooctane, Sulfonic Acid, its salts and Per fluorocotane Sulfonyl Fluoride”;
- Decision IG.20/8.3.4 “Regional Plan on the Elimination of Alpha hexachlorocyclohexane, Beta hexachlorocyclohexane, Chlordecone, Hexabromobiphenyl, Pentachlorobenzene”;
- Decision IG.20/9 “Criteria and Standards for bathing waters quality”;
- Decision IG.20/10 “Adoption of the Strategic Framework for Marine Litter Management”;
- Decision IG.21/3 on the Ecosystems Approach including Adopting Definitions of Good Environmental Status (GES) and Targets”; and
- Decision IG.21/7 “Regional Plan on Marine Litter Management in the Mediterranean”.

Apart from the Barcelona Convention related basis, NAP update is based on the provisions of relevant national enacting legal acts, primarily the following: Law on the Environment (Official Gazette of the Republic of Montenegro 48/08, 21/09, 40/11, 62/13, 27/14), Law on Waters (Official Gazette

Concurrently, NAP's programme of measures establishes a road map to build up the national system adjusted to EcAp-GES requirements with regard to the obligations in the process of transposing the European Union's Marine Strategy Framework Directive (MSFD) into the national legislative and institutional system.

### 2.2 Midterm Baseline Assessment

The midterm baseline assessment provides an assessment of pollution trends, defines the pollution pressures and impacts on the marine and coastal ecosystems. Also, the midterm baseline provides an assessment of the policy, institutional and legislative frameworks relevant for meeting the legally binding requirements of the SAP/MED and Regional Plans, as well as an overview of current projects whose synergetic effects can contribute to the success of meeting the legally binding requirements. The midterm baseline assessment is structured so as to provide an assessment of the situation in respect of the success in terms of fulfilling the technical/pollution reduction requirements and legal and institutional requirements of SAP/MED and Regional Plans. The assessment is structured into
the Fact Sheet A (annex 2 to the NAP) for EO5, EO9 and EO10, as well as into a separate fact sheet concerning the requirements related to public participation, monitoring, public awareness, public access and reporting so as to achieve these three ecological objectives. Gaps of technical, legal, institutional and financial nature in the implementation of legally binding requirements of the SAP/MED and Regional Plans were identified starting from such an assessment of the situation. Identified gaps served as a basis for setting operational targets for meeting the legally binding requirements.

2.3 Operational Targets

The midterm baseline assessment enables identification of the root cause of the problems that characterize the current status of the coastal area pollution trends and their impacts on the coastal and marine environment. A number of drivers have been identified, from the deepest ones to direct causes of problems. Some causes have generated a number of different problems, while on the other hand, many different causes lead to the occurrence of a single problem. Since setting of the operational targets as well as selection of measures in the updated NAPs shall be streamlined into EcAp GES targets, it was necessary to prioritize and shortlist the problems that enable gaps identification in line with the most significant national environmental concerns.

Operational targets were identified in that manner. They were presented quantitatively in the broadest possible scope. There was endeavour to make sure so defined quantifiable operational targets are simultaneously, to the extent possible, SMART i.e., specific, measurable, achievable, realistic and timely.

2.4 Programme of Measures

The programme of measures contains aggregated measures obtained by defining potential measures based on the established gaps within the midterm baseline assessment, with a view to their elimination by achieving operational targets in the time frame of this 2015 NAP. Integrated measures were reached using the form of fact sheets B, C, D, and E. That is why the fact sheets are an integral part of the proposed programme of measures. The fact sheets B (annex 3 to the NAP) define the potential measures. The measures were aggregated in the form of separate fact sheets C (annex 4 to this NAP) so that integrated legal, institutional, policy, economic and technical measures for achieving ecological objectives were obtained. Prioritization of integrated measures carried out by using seven groups of four criteria each has been prepared in the fact sheets D (annex 5 to the NAP). Scoring aggregated measures against the criteria for prioritization is part of Fact Sheet E (annex 6 to the NAP). The programme of measures also includes a cost estimate for the implementation of the programme of measures by using multi-criteria analysis (MCA). The programme of measures established also the monitoring and reporting for aggregated measure in Fact Sheet F (annex 7 to the NAP). The entire presentation of the programme of measures of the 2015 NAP is contained in the comprehensive logical framework for implementation of measures in the form of Fact Sheet G (annex 7 to the NAP).

2.5 Priority Investment Projects

Priorities for investments are mainly focused on technical measures and a small number of policy measures. The choice of priorities was made on the basis of the ranking results of priority measures,
so that the first eight priorities relates to support to the technical remediation measures of polluted sediment in Shipyards Bijela, and of Port Milena canal and building infrastructure for waste water treatment and sewerage systems in the municipalities of Ulcinj, Bar, Kotor, Tivat, and Herceg Novi and remediation of illegal solid waste dumpsites. Small settlements have been recognized as a priority for investments into building infrastructure for waste water treatment and sewerage network: Perast and Risan, Orahovac and Dražin Vrt. From the point of view of policy measures, priority is to ensure investments into the development of IMAP and for MSFD transposition, i.e., achieve good environmental status of marine waters. The priority projects include the development of a marine litter plan, and prevention of waste input into the sea via rivers and torrential flows.
Introduction
SOURCE: NATIONAL TOURISM ORGANISATION
3. Introduction

The legally binding requirements of MAP system arise from the provisions of the Barcelona Convention, LBS, Hazardous Waste and Dumping Protocols. In accordance with the provisions of the Barcelona Convention and its protocols, a number of decisions of Contracting Parties to the Barcelona Convention have been adopted. In terms of the NAP update, the most relevant are those related to adoption and implementation of SAP/MED and decisions adopted in the framework of Article 15 of the LBS Protocol on Regional Plans, as well as decisions on EcAp implementation. Based on the NAP Update Guidelines [UNEP(DEPI)/MED WG.393/10] preparation of the updated NAP is based on the analysis of how SAP-MED sectors and priority substances can be linked to three EcAp pollution-related ecological objectives and vice versa. Since EcAp implementation is yet to take place, the GES targets are not translated to specific circumstances of the coastal area of Montenegro. However, NAP update provides the opportunity to screen a number of challenges related to EcAp implementation in national circumstances and to look for the concept in which to foster consistency in fulfilling the SAP/MED and Regional Plans legally binding requirements with EcAp implementation. When analysing the relevant statutory obligations stipulated in the MAP system, the process of NAP update relies on the achievements made in implementation of the 2005 NAP and challenges faced with regards to its implementation.

3.1 Legal Obligations Stipulated in NAP

NAP is updated by bridging between the SAP-MED commitments, the Regional Plans and three pollution-related ecological objectives EcAp - EO5 on eutrophication, EO9 on contaminants and EO10 on marine litter/GES targets.

EO5 defines 6 GES targets as follows: reduction of BOD emissions from land-based sources, reduction of nutrients emissions from land-based sources, decreasing trend in Chlorophyll-a concentrations in high risk areas affected by human activities, increasing trend of transparency in areas impacted by human activities, decreasing trend in the HABs occurrence frequency and increasing trend in dissolved oxygen concentrations in areas impacted by human activities. The scope of EO9 is based on 5 GES targets as follows: reduction in emissions of contaminants from land-based sources, decreasing trend in the occurrences of acute pollution events, decreasing trend in the frequency of cases of seafood samples above regulatory limits for contaminants, increasing trend in the percentage of intestinal enterococci concentrations within established standards, and a decreasing trend in the HABs occurrence frequency. The scope of EO 10 is based on 3 GES targets: decreasing trend in the number of marine litter items deposited on the coast, decreasing trend in the number of marine litter items in the water surface and the seafloor and decreasing trend in cases of entanglement and/or a decreasing trend in the stomach contents of the sentinel species.

NAP Update Guidelines [UNEP(DEPI)/MED WG.393/10] facilitated work of NAP update teams through the tables that explain the bridging between EO5, EO9 and EO10 and the LBS Protocol targets and its SAP-MED and Regional Plans. The tables show that the commitments under SAP-MED and the Regional Plans/decisions for each ecologi-
provide an overview of the current state of implementation of the legally binding obligations stipulated in the MAP of relevance for the process of NAP update. In this way, the basis was set for identifying implementation gaps and defining the operational targets that are streamlined into ECAP objectives and GES targets.

### 3.2 Overview of the 2005 NAP's Implementation

In accordance with the obligations to which national authorities expressed commitment by adopting the Law on Ratification of the Barcelona Convention, the NAP for LBS caused pollution reduction was developed in 2005. According to the 2005 NAP, the main sources of pollution in Montenegrin coastal area are solid waste and untreated wastewater. Although certain improvement has been achieved, solid waste and untreated wastewater related problems still introduce strongest pressures to marine and coastal environment. The problems are further aggravated during the summer season.

The 2005 NAP has identified sectors for priority actions, hot spots' locations and sensitive areas in the coastal zone, as well a number of measures to address the SAP requirements as follows:

- expansion and rehabilitation of municipal sewerage systems, control of industrial effluents, construction of new wastewater treatment facilities and the closing of septic tanks;
- implementation of an integrated municipal solid waste management system, which includes extension of local landfills into regional ones, encouraging recycling and waste reduction, and closure of illegal dumpsites;

As can be seen, municipal wastewater is addressed by all three EOs. Municipal solid waste is covered by EO9 and EO10. The two Regional Plans on BOD reduction, in addition to the SAP-MED requirements for reduction of nutrients from agriculture and aquaculture, are addressed by EO5 and EO9. A total of 78 legally binding requirements structured as shown above were transferred to Fact Sheets A which under the mid-term baseline assessment
### EO5 on eutrophication

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED and Regional Plans’ technical requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Promotion of separate collection of rainwater and municipal wastewater [deadline not specified]</td>
</tr>
<tr>
<td>2.</td>
<td>Promotion of reuse of treated effluents for the conservation of water resources [deadline not specified]</td>
</tr>
<tr>
<td>3.</td>
<td>Coastal cities and urban agglomerations of more than 100,000 inhabitants are connected to a sewer system [deadline passed]</td>
</tr>
<tr>
<td>4.</td>
<td>Take necessary measures to establish adequate urban sewer and wastewater treatment plants that prevent run-off and riverine inputs of litter [deadline 2020]</td>
</tr>
<tr>
<td>5.</td>
<td>Ensure that all agglomerations of more than 2,000 inhabitants collect and treat their urban wastewater before discharging it into the environment [deadline 2019]</td>
</tr>
<tr>
<td>6.</td>
<td>Prevention of direct and indirect effects of nutrient over-enrichment in the marine environment [deadline 2015]</td>
</tr>
<tr>
<td>7.</td>
<td>Reduce nutrient inputs, from agriculture and aquaculture practices into areas where these inputs are likely to cause pollution [deadline 2025]</td>
</tr>
<tr>
<td>8.</td>
<td>Industrial Food Plants outlined in Annex I which discharge more than 4000 PE into water bodies shall meet the following requirements: COD 160 mg/l or TOC 55 mg/l and BOD 30 mg/l [deadline 2014]</td>
</tr>
<tr>
<td>9.</td>
<td>Dispose all wastewater from industrial plants which are sources of BOD, nutrients and suspended solids [deadline 2025]</td>
</tr>
</tbody>
</table>

### EO9 on contaminants

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED and Regional Plans’ technical requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Application of BAT and BEPs for environmentally sound management of POPs [deadline passed]</td>
</tr>
<tr>
<td>11.</td>
<td>Concentration of priority contaminants in biota, sediment or water is kept within the acceptable limits [deadline not specified]</td>
</tr>
<tr>
<td>12.</td>
<td>Phase out discharges and emissions and losses of mercury, cadmium and lead [deadline 2025]</td>
</tr>
<tr>
<td>13.</td>
<td>Eliminate to the fullest possible extent pollution of the Mediterranean Sea caused by discharges, emissions and losses of zinc, copper and chrome [deadline 2025]</td>
</tr>
<tr>
<td>14.</td>
<td>Phase out to the fullest possible extent discharges, emissions and losses of organomercuric compounds and reduce those of organolead and organotin compounds [deadline passed]</td>
</tr>
<tr>
<td>15.</td>
<td>Phase out inputs of PAHs [deadline 2025]</td>
</tr>
<tr>
<td>16.</td>
<td>Eliminate to the fullest possible extent pollution caused by discharges, emissions and losses of organohalogen compounds [deadline 2025]</td>
</tr>
<tr>
<td>17.</td>
<td>Eliminate to the fullest possible extent inputs of radioactive substances [deadline 2025]</td>
</tr>
<tr>
<td>18.</td>
<td>Dispose all hazardous waste in a safe and environmentally sound manner [deadline 2025]</td>
</tr>
<tr>
<td>19.</td>
<td>Safeguard of the ecosystem function and maintenance of the integrity and biological diversity of species and habitats [deadline not specified]</td>
</tr>
<tr>
<td>No.</td>
<td>Regional Plans’ technical requirements</td>
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<tr>
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<tr>
<td>20.</td>
<td>Restore marine and coastal habitats that have been adversely affected by anthropogenic activities [deadline not specified]</td>
</tr>
<tr>
<td>21.</td>
<td>Identify existing sites which have been historically contaminated with mercury [deadline passed]</td>
</tr>
<tr>
<td>22.</td>
<td>Apply environmentally sound management measures to sites which have been historically contaminated with mercury [deadline 2015]</td>
</tr>
<tr>
<td>23.</td>
<td>Achieve environmentally sound management of metallic mercury from the decommissioned plants [to be achieved following decommission]</td>
</tr>
<tr>
<td>24.</td>
<td>Progressively reduce total releases of mercury (to air, water and to products) from existing chlor alkali plants until their final cessation [deadline 2020]</td>
</tr>
<tr>
<td>25.</td>
<td>Take appropriate measures to isolate and contain mercury containing waste [deadline 2025]</td>
</tr>
<tr>
<td>26.</td>
<td>Identify stock piles consisting of or containing POPs [deadline passed]</td>
</tr>
<tr>
<td>27.</td>
<td>Phase out inputs of the 9 pesticides and PCBs and reduce inputs of unwanted contaminants: hexachlorobenzene, dioxins and furans [deadline passed]</td>
</tr>
<tr>
<td>28.</td>
<td>Ensuring that water quality in bathing waters and other recreational areas does not undermine human health [deadline 2015]</td>
</tr>
<tr>
<td>29.</td>
<td>Minimization of effects of released contaminants to the marine environment so as not to give rise to acute pollution events [deadline 2015]</td>
</tr>
<tr>
<td>30.</td>
<td>Prevention of acute pollution events and minimization of their impacts [deadline 2015]</td>
</tr>
</tbody>
</table>

**EO10 on marine litter**

<table>
<thead>
<tr>
<th>No.</th>
<th>Regional Plans’ technical requirements</th>
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</thead>
<tbody>
<tr>
<td>31.</td>
<td>Reduction of fraction of plastic packaging waste that goes to landfill or incineration [deadline 2019]</td>
</tr>
<tr>
<td>32.</td>
<td>Ensuring adequate urban sewer systems, WWTP and waste management systems to prevent run-off and riverine inputs of marine litter [deadline 2020]</td>
</tr>
<tr>
<td>33.</td>
<td>Application of cost effective measures to prevent any marine littering from dredging activities [deadline not specified]</td>
</tr>
<tr>
<td>34.</td>
<td>Adopt preventive measures to minimize inputs of plastic in the marine environment [deadline 2017]</td>
</tr>
<tr>
<td>35.</td>
<td>Implement programmes of regular removal and sound disposal of accumulations/hotspots of marine litter [deadline 2019]</td>
</tr>
<tr>
<td>36.</td>
<td>Implement adequate waste reducing/reusing/recycling measures in order to reduce the fraction of plastic packaging waste that goes to landfill or incineration without energy recovery [deadline 2019]</td>
</tr>
<tr>
<td>37.</td>
<td>Close, to the extent possible, the existing illegal solid waste dump sites [deadline 2020]</td>
</tr>
<tr>
<td>38.</td>
<td>Remove the existing accumulated litter from Specially Protected Areas of Mediterranean Importance (SPAMI) and litter impacting endangered species [deadline 2019]</td>
</tr>
<tr>
<td>39.</td>
<td>Explore and implement National Marine Litter Cleanup Campaigns; participate in International Coastal Cleanup Campaigns and Programmes; apply “Adopt-a-Beach” or similar practices; and apply “Fishing for Litter” practices [deadline 2019]</td>
</tr>
</tbody>
</table>
### Air pollution

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED’ technical requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.</td>
<td>Promote the introduction of buses using gaseous fuel or other alternative forms of energy instead of diesel oil</td>
</tr>
<tr>
<td>41.</td>
<td>Pursue increased regional and domestic natural gas development projects in order to substitute high sulphur fuel oil with natural gas and natural gas conversion for urban proximities</td>
</tr>
<tr>
<td>42.</td>
<td>Promotion of traffic management that prioritizes the use of public transport</td>
</tr>
<tr>
<td>43.</td>
<td>Improve processes for inspection and maintenance of vehicles and renovation of the oldest vehicles</td>
</tr>
</tbody>
</table>

### EO5 on eutrophication

<table>
<thead>
<tr>
<th>No.</th>
<th>Regional Plans’ legal Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.</td>
<td>Limit concentrations of key nutrients in the marine environment to levels which are not conducive to eutrophication [ECAP Requirement] 2015</td>
</tr>
<tr>
<td>45.</td>
<td>Adopt emission limit values (ELV) for BOD5 in urban wastewater after treatment in accordance with the requirements of the “regional guideline on the reduction of BOD5 from urban waste water” [deadline 2019]</td>
</tr>
<tr>
<td>46.</td>
<td>In case the food sector installation discharges into the sewerage system, the competent authorities shall establish ELV and an authorization compatible with the operation and the emission discharge values of the urban waste water treatment plant [deadline 2014]</td>
</tr>
</tbody>
</table>

### EO9 on contaminants

<table>
<thead>
<tr>
<th>No.</th>
<th>Regional Plans’ legal Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.</td>
<td>Adopt the criteria and standards for bathing waters in the Mediterranean region based on intestinal enterococci</td>
</tr>
<tr>
<td>48.</td>
<td>Adopt National ELVs for mercury emissions based on values included in the “regional plan on the reduction of inputs of mercury” from other than chlor alkali industry [deadline 2019]</td>
</tr>
<tr>
<td>49.</td>
<td>Prohibit the installation of new chlor alkali plants using mercury cells and vinyl chloride monomer production plants using mercury as a catalyst [deadline passed]</td>
</tr>
<tr>
<td>50.</td>
<td>Cease releases of mercury from the activity of chlor alkali plants [deadline 2020]</td>
</tr>
<tr>
<td>51.</td>
<td>Prohibit and/or take legal and administrative measures necessary to eliminate the production and use, import and export of POPs and their waste [deadline passed]</td>
</tr>
</tbody>
</table>
### EO9 on contaminants

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED and Regional Plans' requirements institutional aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>55.</td>
<td>Support, promotion and facilitation of programmes of assistance in pollution control and reduction in the area of scientific, technical and human resources</td>
</tr>
<tr>
<td>56.</td>
<td>Support, promotion and facilitation of capacities to apply, develop and manage access of cleaner production technologies as well as Best Available Techniques (BAT) and Best Environmental Practices (BEP)</td>
</tr>
<tr>
<td>57.</td>
<td>Provision of information to the public about bathing water quality and implemented management measures [deadline 2016]</td>
</tr>
<tr>
<td>58.</td>
<td>Monitor releases of mercury into water, air and soil in order to verify compliance with the requirements [deadline 2015]</td>
</tr>
<tr>
<td>59.</td>
<td>Monitor bathing water quality [deadline 2016]</td>
</tr>
<tr>
<td>60.</td>
<td>Prepare bathing water profiles or beach profiles [deadline 2016]</td>
</tr>
</tbody>
</table>

### EO10 on marine litter

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED and Regional Plans' requirements institutional aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>61.</td>
<td>Enforce measures to combat illegal dumping, including littering, on beaches and illegal sewage disposal in coastal zones and rivers [deadline 2020]</td>
</tr>
<tr>
<td>62.</td>
<td>Seek direct cooperation with other contracting parties, with assistance of the MEDPOL or competent international and regional organizations, to address trans-boundary marine litter cases [as appropriate]</td>
</tr>
<tr>
<td>63.</td>
<td>Control of impacts of litter on marine life to the maximum extent practicable [deadline 2015]</td>
</tr>
<tr>
<td>64.</td>
<td>Report on the implementation of the National Marine Litter Monitoring Programme [on a biannual basis]</td>
</tr>
<tr>
<td>65.</td>
<td>Urban solid waste management is based on reduction at source with the following waste hierarchy: prevention, re-use, recycling, recovery, and environmentally sound disposal [deadline 2025]</td>
</tr>
<tr>
<td>66.</td>
<td>Base urban solid waste management on reduction at source, separate collection, recycling, composting and environmentally sound disposal, by the year 2025 at the latest</td>
</tr>
<tr>
<td>68.</td>
<td>Establish Regional Data Bank on Marine Litter [deadline 2016]</td>
</tr>
</tbody>
</table>
### EO5, EO9, EO10

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED’ requirements public participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>69.</td>
<td>Facilitation of public access to scientific knowledge and activities for protection and management of the environment</td>
</tr>
<tr>
<td>70.</td>
<td>Mobilization, participation and involvement of major actors concerned in protection and management of the environment (local and provincial communities, economic and social groups, consumers, etc.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED’ requirements monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>71.</td>
<td>Establish a monitoring programme of the inputs of priority pollutants identified in the SAP-MED and of the marine environment quality [deadline passed]</td>
</tr>
<tr>
<td>72.</td>
<td>Establish systems of inspection to ensure compliance with conditions laid down in the authorizations and regulations [deadline passed]</td>
</tr>
<tr>
<td>73.</td>
<td>Establish a permanent river water quality/quantity register [deadline passed]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Regional Plans’ requirement public awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>74.</td>
<td>Establish a monitoring programme of the inputs of priority pollutants identified in the SAP-MED and of the marine environment quality [deadline passed]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED’ requirements public access</th>
</tr>
</thead>
<tbody>
<tr>
<td>75.</td>
<td>Provide to the public access to information available on the state of the environment of the Mediterranean and its evolution, and of the measures taken to improve it</td>
</tr>
<tr>
<td>76.</td>
<td>Collect information on the state of treatment and disposal of liquid and solid waste</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>SAP/MED and Regional Plans’ requirements - reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>77.</td>
<td>Publish a report on the state and evolution of the Mediterranean Environment [on a regular basis]</td>
</tr>
<tr>
<td>78.</td>
<td>Application of a unified reporting system for implementing the provisions of the Barcelona Convention, the protocols, SAP-MED, Regional Plans and ECAP objectives</td>
</tr>
</tbody>
</table>
- developing and controlling hazardous waste and medical waste, producing compost from sludge, reduction and elimination of heavy metals, PCBs and organohalogens, and recycling used oil lubricants;
- reduction of emissions from traffic and industrial plants.

Table 1 provides an overview of the current status of implementation of measures that were defined in the 2005 NAP and it lists the reasons for such a situation. The measures are mostly partially implemented or not implemented.

Overview of achievements of relevance for implementation of the 2005 NAP is also based on the findings of:

- midterm evaluation of SAPMED/NAP implementation reports and country profiles and fact sheets completed by UNEP/MAP MEDPOL with input from the contracting parties (UNEP(DEPI)/MED WG.393 inf.3. Midterm Evaluation of SAP/NAP Implementation);
- national and regional reports prepared by the UfM with regards to the investment portfolio of NAP implementation (UNEP(DEPI)/MED WG.393 inf.4. Final Report on Update Priority Investment Projects for Protecting the Mediterranean Sea from Pollution);
- national state of the environment reports prepared during the period 2008-2013;
- biannual reports on implementation of the Barcelona Convention and its protocols;
- Mediterranean state of environment reports for 2009, 2011 and 2012;
- ECAP sub-regional reports on pollution prepared by UNEP/MAP MEDPOL in 2010-2011.

The most important achievement of relevance for the 2005 NAP implementation is establishment of regular marine environment monitoring programme in accordance with MEDPOL. For a number of years this component was lacking in the National Programme for Monitoring the State of the Environment. Taking into account the MEDPOL programme as the basis, and recognizing the priorities of the SAPBIO and SAP MED that are identified in related NAPs, the Programme for Monitoring the State of Marine Ecosystem was defined and launched in 2008. The programmes for 2009, 2010 and 2011 were gradually improved by integrating the relevant requirements of the EEA. It is implemented as the part of the National Programme for Monitoring the State of the Environment of Montenegro. Due to budgeting constrains, in 2012, 2013 and 2014 respectively the Programme for Monitoring the State of Marine Ecosystem was partially implemented or not implemented. In turn, that caused a break in monitoring pollution trends and disabled appropriate reporting on the status of marine environment at the national, Mediterranean and EEA scales. The monitoring of the emissions of some important polluting substances in accordance with the LBS list (organohalogen compounds, POPs, lubricating oils) is not performed continuously.

Significant progress was achieved in improving the national legislation of relevance for NAP implementation as it is presented under point 2.1 and in Annex I to this document.

Overview of achievements of relevance for the 2005 NAP also indicated the need to increase financial resources and technical capacities so as to foster efficiency of NAP implementation. The 2005
### Table 1: Implementation status of measures from the 2005 NAP

<table>
<thead>
<tr>
<th>Sector</th>
<th>Planned (measures in the 2005 NAP)</th>
<th>Implementation status 2013</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Polluting matter</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Planned reduction %</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Entity in charge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indicative period</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reason</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Municipal waste water</strong></td>
<td>BOD and nutrients</td>
<td>PI</td>
<td>Sufficient funding for the reconstruction and expansion of the network and construction of the WWTP have not been provided:</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td></td>
<td>– WWTP Budva is operational;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– WWTP Trašte is being connected and constructed;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– the network is being renovated and expanded and WWTP H. Novi is being built;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– documents for WWTP Ulcinj are being prepared;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– preparation for the construction of WWTP Bar is planned;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– effluent quantity and structure are not measured;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– there is no adequate emission inventory;</td>
</tr>
<tr>
<td><strong>Municipal, industrial solid waste</strong></td>
<td>Paper, metal, glass</td>
<td>PI</td>
<td>Sufficient funding for the implementation of measures and plans were not provided:</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td></td>
<td>– sanitary landfill Možura was built;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– dumpsite Poda for Herceg Novi is active, and it still impacts the environment;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– recycling centre for the coastal region was not built;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– sanitary landfill Lovanja was closed;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– city dumsites were closed;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– ground on closed dumsites has not been re-cultivated;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>– the emission inventory needs to be improved.</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td>55</td>
<td>1, 4</td>
<td>2008</td>
</tr>
<tr>
<td>-----------------</td>
<td>----</td>
<td>------</td>
<td>------</td>
</tr>
</tbody>
</table>
| Exhausted car batteries and tires | | | | Car batteries, tires and electronic waste are partially collected by the private company *Hemosan* and transported to their final recycling. All objects have not yet been included into this process, and the amount of waste collected is not at the desired level.  
- There is no adequate inventory of produced and collected waste of this type. |

<table>
<thead>
<tr>
<th>Equipment containing PCBs</th>
<th></th>
<th></th>
<th>PI</th>
<th>Sufficient funding for the export of PCBs oils and equipment and waste with PCBs have not been provided:</th>
</tr>
</thead>
</table>
|                           |   |   |   | - Stockholm Convention NIP adopted (POPs);  
- Most of transformers with transformer oil containing PCBs were replaced. One part of contaminated equipment remains. |
<table>
<thead>
<tr>
<th>Grit</th>
<th></th>
<th></th>
<th><strong>NI</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Sufficient funding for the export of used grit that has the characteristics of hazardous waste have not been provided:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>– Grit is collected in large bags in Adriatic Bijela Shipyard and disposed of at the local landfill inside the facility, until the expected final export so as to be treated, or until another solution has been found. Material taken care of in this manner is not safe, as it is subject to being run off by rain. Large quantity of grit and its composition, closeness to the shore and the fact that it is not secured, still represent a major threat to the marine ecosystem.</td>
</tr>
<tr>
<td>– Sediment remediation at the bottom of the sea, next to the former Arsenal in Tivat (now Porto Montenegro) was not performed.</td>
</tr>
</tbody>
</table>

---

1 Ministry of Sustainable Development and Tourism;

2 PIU (Waste Water Master Plan);

3 Public Enterprise Waterworks and Sewerage;

4 Inter-municipal company that should be established (under the Solid Waste Master Plan);

5 Private company Hemosan from Bar;

NI - NOT IMPLEMENTED

PI - PARTIALLY IMPLEMENTED

I - IMPLEMENTED
NAP pollution reduction measures related to solid waste and waste water management were based on the actions that had been previously defined in the Master Plan for Waste Water Treatment in the Coastal Area of Montenegro and Master Plan for Solid Waste Disposal in the Coastal Area of Montenegro. Report prepared by the UfM in 2011 with regard to the assessment of the investment portfolio of NAP implementation provided the pollution load estimates for wastewater and solid waste projects, referring to total loads of all NAP projects and the new projects identified through available reports and databases in 2011, in communication with relevant stakeholders. The estimates were experts’ assessments and were subject to a number of factors, including the accuracy of information provided by countries, rate of project implementation, and funding to be secured and actually allocated to projects. The summary contaminants calculation for Montenegro indicated the target pollution reduction and the estimated pollution reduction for 2025 which still show a de-pollution gap (DG2025) of around 27% of the target pollution reduction 2025 (T2025) for BOD5, in the area of the WW projects listed as relevant in 2011. The gap may result from various factors such as the percentage connection or network performance or capacity of the WWTP in 2025. The gap can be used as an indicator to ensure that all project components are completed to achieve the SAP targets.
NAP Update Process
4. NAP Update Process

In accordance with the NAP Update Guidelines [UN-EP(DEPI)/MED WG.393/10] NAP updating process consists of four steps. The group of tasks is related to achieving each of the four steps updating process.

First step “Midterm Baseline Assessment” related tasks are:

- Describe the current environmental status vis-à-vis the underlying activities related to SAP-MED sectors and priority substances;
- Describe human activities affecting the coastal and marine environment (direct and indirect benefits, related pressures, impacts, expected trends);
- Describe existing measures implemented in the framework of SAP-MED (i.e. the 2005 NAPs), Regional Plans and GES targets;
- Describe expected environmental status (i.e. midterm baseline scenario) according to pressures, existing measures, and implemented policies.

Second step “Analysis of gaps, prioritization of issues and target setting” related tasks are:

- Describe the national situation with regards to GES targets, SAP-MED and Regional Plans requirements;
- Populate to the extent possible the list of NAP indicators including EcAp/GES, and identify the gaps between the GES targets, SAP-MED and Regional Plans requirements and the midterm baseline;
- Analyse the gaps, identify related issues and prioritize based on environmental concerns in order to derive a realistic set of operational targets for 2025;
- Formulate the national operational targets in order to meet GES targets and SAP-MED and Regional Plans requirements.

Third step “Development of programme of measures” related tasks are:

- Develop/describe potential new measures at administrative level of the coastal region to meet national operational targets if the gap is not closed by existing measures;
- Aggregate measures horizontally and vertically (i.e. between sectors and across at administrative level of the coastal region from local to national) which are co-dependent on each other for the achievement of the national operational targets;
- Short list aggregated measures nationally based on agreed criteria;
- Integrate proposed measures into the framework of existing policies; Undertake economic analysis of shortlisted measures at the national level;
- Select final NAP programme of measures;
- Elaborate in more detail priority investment projects.

Fourth step “Review and approval, and implementation follow-up” related tasks are:

- Present final NAP programme of measures (PoM) for public consultation and review by stakeholders. Amend and obtain the necessary approvals;
- Develop appropriate monitoring, follow-up and reporting plan based on linkages be-
4.1 Institutional Arrangements for Development of NAP and Consultation Process

Taking into consideration that the main objective of NAP revision is the improvement of sustainability, pragmatism and integrated approach in the definition of measures for elimination of pollution in coastal areas, whilst ensuring compliance with the Ecosystem Approach principles (EcAp), institutional structure in charge of monitoring and administration of the NAP revision process has to respond to expectations of this complex process. This is why it has been decided to establish the Steering Committee for the process of NAP update that is composed of representatives of ministries, expert institutions, local self-government administration, business sector and NGOs which are competent for the implementation of issues pertinent to the NAP. Experience gained in the 2011-2015 period by the Steering Committee for CAMP and NS ICZM has served as the basis for definition of the structure and the method of work of the Steering Committee for NAP revision.

Taking into consideration:

- the competences of relevant ministries and institutions in the system of public administration from the aspect of the coastal zone protection and management,
- tasks of local self-government bodies in issues related to the coastal zone protection and management,
- contribution of companies/business entities in the overall pollutant emissions into coastal ecosystems,
- it has been decided that the Steering Committee for NAP update should include representatives of the following institutions: the Ministry of Sustainable Development and Tourism, Ministry of Agriculture and Rural Development, Ministry of Transport and Maritime Affairs, Environmental Protection Agency of Montenegro, Hydrometeorological and Seismological Office, Public Enterprise for Coastal Zone Management, Institute of Marine Biology, Maritime Safety Department, Institute Igalo, Centre for Eco-toxicological Research, municipalities Tivat, Budva, Kotor, Herceg Novi, Bar, Ulcinj, Port Authority in Kotor and Port Authority in Bar, Port of Bar, Vodacom Tivat, Porto Montenegro, Shipyard in Bijela, Hemosan from Bar, and the NGO Expeditio.

Ms. Ana Mišurović, MSc, has been engaged to deal with NAP revision according to UNEP/MAP procedure, as the lead expert. Coordination of the process of NAP update was the responsibility of Ms. Jelena Knežević, MAP National Focal Point for Montenegro. Expert support to the NAP update process has been also given by Ms. Ivana Bulatović, MEDPOL Focal Point, Ms. Milena Bataković, SPA/RAC Focal Point, as well as Mr. Pavle Đurašković, expert collaborator within the framework of the MEDPOL. Ms. Ivana Bulatović and Ms. Milena Bataković lead thematic working groups within 3 key groups of issues: eutrophication, contaminants and marine litter. Members of these thematic groups were representatives of the Environmental Protection Agency and, when necessary, representatives of other competent institutions. The thematic group for environmental infrastructure was led by Ms. Snežana Didanović,
advisor at the Ministry of Sustainable Development and Tourism in charge of wastewater issues.

A number of meetings of thematic working groups took place in the scope of the NAP update process. Meetings were organized with the aim to discuss tasks related to each of the four steps of NAP update process, including methodology to be applied and data to be collected and analysed, but also to prepare expert inputs for the lead national expert and to discuss and revise outcomes of the lead national expert.

In the initial phase of NAP update a range of issues requiring consultations with MEDPOL expert team has been identified, indicatively:

- identification of issues to be corrected in the Draft NAP;
- range of information to be examined within the mid-term baseline; setting operational targets, numeration method, operational targets and measures; integration of measures, etc.;
- approach to the financial assessment and the choice of optimum approach with respect to limitations that exist in the national context;
- explanation of the structure and correlation of obligations from SAP/MED and Regional Plans of the one hand, as well as their relation with requirements related to EcAp implementation, of the other.

The above mentioned issues have been identified as relevant at the meetings of thematic working groups, meetings of thematic groups with the lead expert and meetings of the national team with MEDPOL expert team.

After that, a number of issues were discussed at national expert team meetings that followed, such as:

- how to move forward with midterm baseline assessment (Fact Sheet A) as much as possible;
- definition of operational targets and how to close gaps by defining appropriate measures;
- identification, aggregation and prioritization of measures;
- integration of NBB outcomes into NAP;
- methodologies for NBB calculations and NBB weakness regarding its contribution to NAP development;
- economic analysis and cost assessment of the NAP Programme of Measures.

The above listed issues have been subject of the extensive consultations among national team and MEDPOL expert team by organizing two common technical meetings and through regular on-line correspondence.

Important element of the consultation process concerns the organization of two Steering Committee meetings. The first Steering Committee meeting was organized on 22 December 2014 in view of presenting operational targets and measures and involving SC members in prioritization of the measures, while the second one was held in April 2016 in view of discussing and approving the final updated 2015 NAP.

4.2 Geographical Coverage

There are two river basins in Montenegro - Adriatic Sea and Black Sea. Since Adriatic Sea basin covers an area that is slightly wider than the area
of relevance for implementation of Barcelona Convention, it was decided to implement NAP update at administrative regional level that is defined in accordance with requirements of the ICZM Protocol of Barcelona Convention. In geographic terms, extent of the coastal zone of Montenegro is defined as the area within administrative boundaries of 6 coastal municipalities: Herceg Novi, Kotor, Tivat, Budva, Bar and Ulcinj (with the exception of the areas designated as national parks Lovćen and Skadar Lake), as well as the stretch of sea extending to the outer border of the territorial sea. Several other terms are commonly used for the land part of the coastal zone including coastal or southern region, and the Montenegrin coast.

4.3 Working Methodology for Updating the NAP

As explained above, NAP update process consists of 4 steps and of a number of tasks related to each of them. Midterm baseline assessment is the first and crucial step in the NAP update process. The success of this step determines the success of the overall NAP update process. Determination of operational targets is not possible without precise and detailed identification of the root cause of the problems that characterize current status of the coastal area, determination of pollution trends and their impacts on coastal and marine environment. Thus it was necessary to analyse a broad spectrum of national legal acts and policy documents that are relevant for the protection and sustainable development of the coastal area. The analysis resulted in a description of the current environmental status vis-à-vis the legally binding obligations of SAP-MED and Regional Plans. Human activities that generate anthropogenic pressures to marine and coastal environment have been analysed with the aim to recognize problems, root causes of problems and impacts of problems. A number of drivers have been identified, from the deepest ones to direct causes of problems. Special attention was paid to the sectors, sub-sectors and pollutants that were analysed in NBBs, but also to the priority substances. All relevant sources of information have been used as the basis for assessment of the mid-term baseline: all relevant national policy documents, status of implementation of national legislation and implementation of projects/outcomes of projects that are consistent with expectations towards SAP/MED and Regional Plans implementation. Pollution trends have been identified by using data from the official marine ecosystem monitoring, which is a segment of the National Programme for Monitoring of the State of the Environment of Montenegro, but also from some expert and scientific projects that were recently implemented, such as vulnerability assessment of the coastal area in the scope of CAMP Montenegro. A comparison between calculation of pollution load given in the 2008 and 2013 NBBs has been also used in making a description of pollution trends. Upon description of the current environmental status, including determination of pollution pressures and impacts, the gaps between the GES targets, SAP-MED and Regional Plans requirements (listed in chapter 3.1) and the midterm baseline have been identified. In such a way, a broad list of problems was recognized. However, the list of problems was shortened so as to narrow down and aggregate responses to the problems to specific SAP/MED and Regional Plans requirements and later to make a selection of measures in the updated NAP that are streamlined into EcAp GES targets. When identifying the gaps special attention was paid to recognition of the gaps in national legisla-
The aim of the second step of NAP update methodology was to make an analysis of gaps, prioritize issues and to set the operational targets. Gaps of technical, legal, institutional or financial nature in the implementation of legally binding requirements of the SAP/MED and Regional Plans served as a basis for setting operational targets for meeting the legally binding requirements. Definition of gaps in relation to the legally binding obligations of SAP/MED and Regional Plans was primarily based on the need for operational targets and related measures to lay the foundation for achieving new commitments undertaken on the basis of the Barcelona Convention, with a particular focus on Regional Plans in the timeframe of this NAP. An overview of identified gaps is presented in Chapter 6. Although the application of EcAp was not mandatory in Montenegro until now, and especially given the fact that GES targets have not been transposed into the national context, the non-compliance of national legislation and policies with the expected obligations with regard to the application of EcAp and GES targets was taken into account while identifying gaps, especially with reference to the key priority contaminants and related sectors. Priority substances refer to the following ones: Nutrients (related to EO5); metals and related compounds (related to EO9); Organohalogen compounds (related to EO9); total suspended particulates (related to EO9); total Volatile Organic Compounds; nitrogen oxides, NH₃, Sulphur oxide; Organohalogenated pesticides/biocides (related to EO9). Yet, non-compliance of national legislation, policies or of monitoring and reporting on the state of the marine environment with the requirements of Regional Plans dominantly influenced the selection of priority gaps that have served as the basis for setting the operational targets.

In doing so, priorities were the problems that characterize hotspots whose evaluation was done under the NAP following the recommendations from the NAP update Guidelines (UNEP(DEPI)/MED WG.414/3), starting from registered increased pollution levels in comparison to the nationally prescribed norms. Also, pollution pressures which reflect negatively on the attractiveness of the coastal area in terms of tourism development were treated as a priority, given that tourism sector is the most important driver of overall development of Montenegro. Thereat, operational targets set in a such a manner enabled to define a programme of measures with positive effects both in terms of improving the state of the environment and protecting public health, and in terms of preventing economic losses due to reduction in the attractiveness of a tourism destination, reducing the value of ecosystem services or falling fish stocks.

Chapter 7 contains an overview of the operational targets that are defined with the aim to achieve legally binding requirements of SAP/MED and Regional Plans streamlined into EcAp ecological objectives: one related to EO5, three related to EO9 and an additional one related to air pollution as an issue of relevance for EO9, three related to EO10 and one of relevance for Public Participation, Monitoring, Public Awareness, Public Access and Reporting respectively.

Operational targets from official and valid policy documents, primarily in the field of waste management and waste water were taken into account for quantification of operational targets. Furthermore,
evaluations on pollutant emissions and pollution load given in the 2013 NBB, as well as operational targets set in the 2005 NAP were used as the basis for determining the quantitative expression of operational targets. Since the implementation of adopted national policies is mandatory, operational targets in the updated NAP were defined so as to be in accordance with the relevant official national policies.

The 2005 NAP set some operational targets to respond to SAP/MED requirements. In the municipal waste water sector, the target set was to reduce BOD and nutrients by 50%. In the municipal and industrial solid waste sector, the operational target set was to reduce paper, plastic and glass by 55%. In the hazardous waste sector there were two operational targets - oil and oiled waste reduction by 55% and batteries and car tyres reduction by 55%, while there was no quantified expression of operational targets for equipment with PCBs contents and grit. Following the assessment of the implementation status of related measures, it is obvious that targets were not realistically set, they were set too ambitiously.

Keeping this in mind, a new set of operational targets was set pragmatically, based on realistically projected obligations in officially adopted and legally binding national strategic and policy documents. Thus, the operational targets are sometimes less ambitious than the expectations defined in the Regional Plans, expressed mainly through sectoral needs and where possible through reduction of pollutants. However, as national policies are subject to active implementation, national commitments to fulfilment of MAP legally binding provisions must match the official national policy documents.

Compared to the 2005 NAP, operational targets of the 2015 NAP were grouped per ecological objectives. There is an operational target for EO5 that stipulates that the share of treated waste water represents 60% of the total waste water volume, as well as the need to increase connectivity to sewerage system to 75-80%.

Although the 2005 NAP did not define quantified reduction of PCB stocks, the new NAP sets forth the obligation to provide progressive reduction of PCBs until 2025. There is also a quantified target on 70% reduction of hazardous substances emissions from Bijela Shipyard by 2020. Due to lack of an analysis aimed at introducing EcAp and related IMAP at national level, as well as lack of documents to support MSFD transposition, related operational targets define the obligation to reach good environmental status by 2025.

Based on the national policy and waste management action plan, it was possible to set a quantified operational target for municipal waste. Thus for EO10 there is an operational target that sets out the obligation to have minimum 98% of municipal waste collected and 50% of collected municipal waste recycled. Due to lack of precise and continuous measurements of river inputs the 2015 NAP recognized the need to reduce to a minimum runoff and river inputs of solid waste by 2020. Also, following official national policy documents the 2015 NAP sets out the obligation to fully eliminate improperly managed solid waste disposal sites in the coastal area.

Given the lack of sufficient number of air pollution measurements from transport sector, the 2015 NAP defines the obligation to provide continuous
reduction of air pollution both from transport at land and sea.

Following the gaps that are determined in midterm baseline assessment regarding monitoring, reporting, public participation, public awareness and public access, the new NAP defines the need to enable improved monitoring and pollution prevention and control of the marine environment by 2020.

The aim of the third step of NAP update was to develop the programme of measures in view of closing the identified gaps. Progress in implementation of the set of measures defined in the 2005 NAP was analysed with the aim to identify which of non-implemented or partially implemented measures may be transferred to the new programme of measures. In fact, the new set of legally binding obligations arising from SAP/MED and Regional Plans is significantly wider than one that was the basis for the 2005 NAP measures. Thus, non-implemented or partially implemented measures have been integrated into a new set of national commitments towards fulfilment of MAP's legally binding obligations.

As presented under point 2.4, potential measures (Fact Sheet B) are formulated with the aim to achieve operational targets within the defined deadlines. In such a manner new potential measures are proposed to close the related gaps identified in the midterm baseline assessment. The measures are structured into five groups: legal, institutional, policy, economic and technical. One simple criterion was applied to aggregate the measures - whether a single measure is dependent on another for the achievement of an operational target or not. Identification number was associated to each measure in accordance with recommendations that were defined in the document Facilitating the implementation of NAP update Guidelines (UNEP(DEPI)/MED.WG.414/3). Measures are further aggregated (Fact Sheet C) to get integrated and concise legal, institutional, policy, economic and technical measures. The administrative level for implementation of each aggregated measure was determined. Implementation of measures is mainly national level one, or combined national and local administration levels.

Prioritization of integrated measures (Fact Sheet D) was done by applying seven groups of four criteria each, defined in accordance with the recommendations of the Facilitating the implementation of NAP update Guidelines tailored to the specific national circumstances and needs. The following sets of criteria were applied: contribution to the elimination of hotspots, technical readiness of engineering documents, urgency of implementing measures, overall effect of implementing measures, contribution to the fulfilment of ecological objectives, contribution to the fulfilment of other international obligations and the costs of measure implementation. Each of the criteria within the seven groups was assigned values from 1 to 4, with the highest score indicating the most favourable measure.

An overview of the prioritization criteria is presented below.

**1. CONTRIBUTION TO THE ELIMINATION OF HOTSPOTS**

- 4: significantly contributes to improving the health of the population and the state of coastal and marine ecosystems, and provides a positive impact on tourism
3: moderately contributes to improving the health of the population and the state of coastal and marine ecosystems, and provides a positive impact on tourism

2: limited contribution to improving one of the observed aspects - the health of the population and the state of coastal and marine ecosystems, achieving a positive impact on tourism

1: does not contribute significantly to any of the observed aspects – improving the health of the population and the state of coastal and marine ecosystems, achieving a positive impact on tourism

2. TECHNICAL READINESS

4: fully prepared design documentation and compliance with the spatial planning documents is evident, if necessary

3: conceptual design was prepared (or the equivalent level of readiness of mandatory main documents) and compliance with the spatial planning documents is evident, if necessary

2: there are only input data necessary for the development of design documentation

1: there are no available mandatory main documents and input data are either non-existent or limited

3. URGENCY OF IMPLEMENTATION OF MEASURE (based on national needs and statutory obligations and/or in relation to the statutory deadlines regarding the implementation of the Barcelona Convention)

4: it is essential that the implementation of measure begins within a year

3: implementation of measure can be planned in the medium term of 3-5 years

2: implementation of measure is not urgent and can begin after 2020

4. OVERALL EFFECT OF MEASURE IMPLEMENTATION

4: implementation of measure achieves significant overall integrated effects on the environment, the health of the population and the economy, including development effects on local self-governments

3: implementation of measure achieves moderate overall integrated effects on the environment, health and the economy, including development effects on local self-governments

2: implementation of measure achieves smaller overall integrated effects on the environment, health and the economy, including development effects on local self-governments

1: implementation of measure does not have integrated effects on the environment, health and the economy, including development effects on local self-governments

5. CONTRIBUTION TO THE Fulfillment of ECOLOGICAL OBJECTIVES

4: contribution given to a significant extent in fulfilling all three observed ecological objectives (EO5, EO9, EO10) and other NAP objectives

3: contribution given to a moderate extent in fulfilling all three observed ecological objectives (EO5, EO9, EO10) and other NAP objectives
- 2: contribution given to a lesser extent to fulfilling two ecological objectives and/or other NAP objectives
- 1: contribution given to fulfilling one ecological objective and/or another NAP objective

6. CONTRIBUTION TO THE FULFILLMENT OF OTHER INTERNATIONAL OBLIGATIONS

- 4: measure contributes to a significant extent to fulfilling both the obligations related to the EU integration process and obligations related to the implementation of other conventions (e.g. the Stockholm Convention, Basel Convention, etc.).
- 3: measure moderately contributes both to fulfilling EU integration obligations and obligations related to implementation of other conventions (e.g. the Stockholm Convention, Basel Convention, etc.).
- 2: measure partially contributes to fulfilling EU integration obligations and obligations related to implementation of other conventions (e.g. the Stockholm Convention, Basel Convention, etc.).
- 1: measure does not contribute to fulfilling EU integration obligations or to fulfilling obligations related to implementation of other conventions (e.g. the Stockholm Convention, Basel Convention, etc.).

7. IMPLEMENTATION COSTS

- 4: less than €100,000 is needed to implement the measure
- 3: €100,000-500,000 is needed to implement the measure
- 2: €500,000 – 2.5 million is needed to implement the measure
- 1: more than 2.5 million is needed to implement the measure

Measures were ranked further to the total score obtained for each aggregated measure by using the said groups of criteria (Fact Sheet E). Measures have not been shortlisted, but ranked in the order of priority of their implementation, and indicators for monitoring their implementation were also defined. In fact, it was found that the total set of aggregated measures enables a comprehensive programme for efficient fulfilment of operational targets, and that none of the proposed measures should be eliminated. This approach is based on the fact that problems and causes of problems were prioritized already when gaps were identified, and therefore a shortlisted overview of gaps and of the associated operational targets was proposed.

Given the importance of the proposed programme of measures and restrictions in the application of CEA and CBA for economic analysis, costing was calculated for all prioritized aggregated measures. In explanation, due to the lack of data in national sources, and the time restrictions for the development of the NAP, application of economic analysis tools such as cost-effectiveness analysis (CEA) and cost-benefit analysis (CBA) was not possible. Instead, multi-criteria analysis (MCA) was applied for the final selection of programmes of measures. In this context for economic multi-criteria analysis, two groups of applied criteria for prioritization are relevant: overall effect of the implementation of measures (relevant for the MCA because it also treats to some extent the financial aspect of the implementation of measure within the overall effect) and the estimated implementation costs (fully
relevant to the MCA). These two groups of criteria important for the MCA economic assessment have been applied as additional criteria for the prioritization of measures.

Members of the National Steering Committee participated in proposing the criteria groups and in scoring by using the seven groups of criteria, which contributed to a more objective evaluation and ranking of the proposed aggregated measures. The seventh group of criteria – implementation costs – allowed national policy makers, but also other relevant national and international stakeholders, to be informed about the implementation costs of the programme of measures and to be aware of the support they have to provide to implement the proposed programme of measures.

While formulating measures, gaps and operational targets set in respect of the "hot-spot" status in accordance with the recommendations set out in Facilitating the implementation of NAP update Guidelines (UNEP(DEPI)/MED.WG.414/3) were specifically taken into account. The following groups of criteria: public health, GES and pressures, economic and transboundary effects were used to define priority type A hot spots, type B hot spots and sensitive area type C hot spots. Update of the hotspots and their classification based on the new evaluation criteria is presented in chapter 5.2. Updating the criteria for assessment of national hot spots and sensitive areas was carried out in the context of fulfilling the SAP/MED and Regional Plans legally binding requirements and EcAp implementation.

The fourth step for the 2015 NAP update defined the concept for review and approval of NAP, as well as the monitoring and reporting of NAP measures. The consultative process on the proposal of NAP was organized in the form of consultations in the stages of measures formulation and final approval of aggregated measures. Expert Working Groups and the Steering Committee meetings acted as fora for the consultation process, as explained above under point 4.1. For aggregated measures (Fact Sheet F), the mode of following-up and reporting on the measures was decided, by determining frequency, responsibility for collection and analysis, responsibility for reporting on indicators and the media for public access.

The comprehensive Logical Framework for Implementation of Measures (Fact Sheet G) integrated all aspects important for the implementation of formulated measures: links with operational targets, administration levels for implementation of measures, implementation timetable and costs, capacity building needs, leading institution responsible for implementation and other relevant stakeholders, risks and assumptions, monitoring, tracking method and follow-up and monitoring indicator.

As it is noted in 2.5 the priorities for investments are mainly focused on technical measures and a small number of policy measures. Starting from the cost estimate for aggregated measures, funds provided thus far, if any, and missing funds, the investments proposed are those which have not secured funds from national public sources. The methodology for selection of the investment projects and list of the priority investment project are presented in chapter 8.2.
Midterm baseline assessment
5. Midterm baseline assessment

The coastal zone of Montenegro is one of the most valuable national resources. The area has a high development potential which is of vital importance for the development of Montenegrin society. However, it is also characterised by complex relations between human activities and natural environment that often result in pronounced pressures on natural resources.

Geographic scope of the coastal zone is defined in accordance with requirements of the Protocol on Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol). Even though the coastal zone has a treatment of special purpose area in the spatial planning system, it is largely integrated with other parts of the country when functional, economic, cultural and environmental aspects are considered.

Natural characteristics of coastal area of Montenegro

Diversity of geologic base, landscape, climate and land, as well as geographic position of Montenegro in the Balkan Peninsula provided for development of high-value biological diversity. This categorises Montenegro as a biological “hot-spot” of importance both in Europe and worldwide. The coastal zone of Montenegro is also characterised by a high degree of diversity and specific habitats and species.

Due to favourable geomorphologic and geographical characteristics, human presence at the Montenegrin coast dates back to Younger Stone Age. Millennia-long presence of human communities, coupled with particularities of the natural position and influences of different cultures have been turned into a rich cultural heritage of the Montenegrin coastal zone.

Typical coastal and seaside habitats are found on the rocky coast (cliffs), numerous natural sand beaches, as well as on (eight) small isles. On the southern slopes of coastal mountains, typical Mediterranean vegetation of macchia and garrigue has developed, and on lower terrains and the coast itself – halophyte vegetation, as well as cultivated terrains with olive and fruit groves. Coastal mountains Orjen, Lovćen and Rumija (with the surrounding hills and mountainous areas) are considered diversity centres of vascular flora.

Coastal zone sites where greatest number of habitats of international importance occurs (including marshy habitats) are: Ulcinj region including its hinterland, in particular Long Beach (Velika plaža) and Ada Bojana; Buljarica; and certain still preserved parts of the Boka Bay. Confluences of rivers (Bojana, Sutorina and other small water flows) also make a part of coastal habitats important for biodiversity preservation. On the sand dunes of Long Beach, unique halophytic vegetation is found. Tivat Salinas and Ulcinj salt works are localities of great importance with halophytic vegetation on muddy-clay grounds. This type of vegetation has almost disappeared from the eastern coast of the Adriatic, and in Montenegro it can only be found on said localities. Specific fauna, particularly rich birdlife, is also typical for this vegetation.

In addition to algae flora, seaweed meadows of Posidonia oceanica and Cymodocea nodosa can be
found in the marine ecosystem. A substantial number of animal species is linked to their life cycle. The Adriatic Sea fauna has still not been completely explored, however recent data has shown that more than 40 species of sponge, 150 crustacean species, 340 molluscs, over 400 fish species, three sea turtle species, and four dolphin species live in the Montenegrin part of the Adriatic.

In the land part of the coastal zone there are locations with vulnerable biodiversity which should be protected from negative impacts, particularly by preserving their completeness, and these are: Orjen, Boka Bay, Vrmac, Buljarica, Rumija, Lake Šas, Long Beach, as well as parts of natural preserved coast. Based on a detailed mapping of terrestrial habitats, by applying multi-criteria approach, the habitats on Long Beach, Tivat Salinas, Buljarica and Platamuni4 have been assessed as particularly valuable. In the marine part of the coastal zone, habitats of Posedonia oceanica, as well as underwater caves have been assessed as vulnerable.

Zones of vulnerable or valuable biodiversity to a significant extent coincide with the network of the existing and planned protected natural assets. The existing spatial planning documentation contains proposals for placing under protection new protected natural assets in the terrestrial part of the coastal zone as follows: national park Orjen, regional parks Rumija and Vrmac, monuments of nature (terrestrial) Ulcinj salt works, Lake Šas and Ada Bojana.

There were no new designations of protected areas at the coast over the last couple of decades (with the exemption of Tivat Salinas). Even though strategic and planning documents envisage proclamation of marine protected, they have not been established yet, whereas basic surveys have been carried out for a significant number of marine sites.

The existing protected natural assets include parts of the national parks Skadar Lake and Lovćen, special nature reserve (Tivat Salinas), several monuments of nature (including around 20 beaches and other sites), several landscapes with special natural characteristics, as well as the area of Kotor-Risan Bay with the town of Kotor (which is protected under a municipal regulation and is on the UNESCO list of natural and cultural heritage). Due to their importance for coastal zone biodiversity, several individual dendrologic objects have also been protected. In a situation where boundaries of the existing protected natural assets are not defined precisely and where the zones of potential protected natural assets (which have been recognised as valuable in the valid spatial planning documentation) have been approximately defined, the available data has been analysed by using GIS. Based on the results obtained, it has been established that the share of terrestrial protected natural assets in the overall surface of six coastal municipalities amounts to 8.6% (including land part of UNESCO’s protected area of the Kotor-Risan Bay), while the share of potential protected natural assets amounts to 18.8%. The overall surface of these areas amounts to 9,000 ha (including marine areas and corresponding coastal belts).

Landscape diversity of the coastal zone represents natural wealth and a significant resource which contributes to tourist recognisability and attractiveness. Cultural patterns as an element of cultural identity and heritage have been created through the influence of human activities on landscapes. Valuation of types of landscape character in the
The coastal zone reveals three categories of exceptionally valuable landscapes important for preservation of authenticity and beauty of the coastal zone of Montenegro: natural and semi-natural landscapes, cultural landscapes, special agricultural landscapes. Landscapes are exposed to the impacts of accelerated transformations that often lead to negative changes. Processes that have the most significant impact on landscape include urbanisation and infrastructure development that undermine the system of linkages and lead to landscape fragmentation. Inadequate siting of tourist and recreational attractions in the most valuable parts of the coastal zone leads to disappearance of natural habitats and homogenisation of landscapes. Depopulation of rural areas and abandonment of the traditional way of land cultivation lead to changes in landscape character and its disappearance, although it is the basis of the coastal zone’s cultural identity.

The characteristics of Montenegrin sea

Montenegrin sea consists of two substantially different areas judging by their geographic, hydrographic and oceanographic characteristics: the Boka Bay and the open sea extending from the coastal line. The total surface of the marine water area is 6,347 km², and of the territorial sea around 2,100 km² (of which 89 km² in the Boka Bay). Maximum registered amplitude of change in the sea level due to tide is 131 cm.

The sea is one of the most important resources and basis of development of economic activities such as bathing and nautical tourism, maritime transport, ship building, fisheries and aquaculture. Other than these, the sea offers possibilities for economic activities which are currently not developed in Montenegro – biotechnology, exploitation of living and inanimate components of marine environment for pharmaceutical purposes, exploitation of minerals, oil and gas, energy, and other. Marine ecosystems provide a series of services (production, cultural, and other) which are of utmost importance for economy and wellbeing of people. Montenegrin marine resources are exposed to numerous and diverse pressures which primarily include impacts of pollution from untreated municipal waste water, solid waste, ship building/repair, from ports and marinas (which as a rule are not adequately equipped to accept waste from vessels and minimise negative impacts on the marine environment), as well as from vessels and industry. CAMP Vulnerability Assessment (based on data from the Monitoring programme on the state of Montenegrin coastal waters ecosystems which was carried out in the period 2008-2011) has shown a high vulnerability of the sea in the Boka Bay, at certain locations in Budva, Petrovac, Sutomore, Bar, and Ulcinj, as well as at the open sea. The following were singled out as exceptionally vulnerable: narrow part of the Boka Bay, part between Bijela Shipyard Porto Montenegro port, the Bay of Igalo and the narrow shallow belt from Valdanos to the Bojana River mouth. The narrow coastal belt of the open sea and the Boka Bay are also very vulnerable to pollution from possible accidents at the sea.

Waters in coastal area of Montenegro

Montenegrin coastal zone as well as the southern Adriatic marine water area are characterised by a high level of precipitation (with unfavourable seasonal oscillations), but also a high runoff. Due to relatively fast infiltration through the porous
surface, water balance is unfavourable, and there is a lack of water in critical periods (vegetative and tourist season periods). Except for the river Bojana, all rivers have fast and short courses with major fluctuations in the flow, and are often of torrential character. Hydrologic observations and continuous measurements over a longer period of time (around 20 years) exist only for the rivers Bojana, Željeznica and Sutorina, as well as for the Reževića river (for the latter the latest observation of water level has been carried out only over a period of 16 years). As for standing waters, there is only Lake Šas in this area. Skadar Lake does not physically belong to the coastal zone, but it is important because of its influence on the upper flow of the Bojana River.

Groundwater sources occur in the form of karst and condensed aquifers and aquifers which are formed in specific conditions of the three main hydro-geologic units in the coastal zone (coastal belt, Cukali zone and high karst). Even though drinking water reserves of karst aquifers are significant, they are insufficient for water supply, mostly due to unfavourable precipitation pattern and a steep increase in water demand during the summer period. Salt water intrusion also contributes to problems with using local groundwater springs for water supply. Mineral waters occur in the coastal zone of Njivice and Ulcinj. Beside mineral waters, there are also mud deposits significant for balneological purposes.

The existing state of exploitable reserves in the groundwater deposits during dry period as well as a poor state of hydro-technical infrastructure point to the need to optimise use of the existing deposits, discover new ones and level the annual flow of the most significant karst springs. Systematic observations of changes in the abundance of either permanent or occasional springs in their outflow zones, changes in chemical traits, salt water intrusion and other important parameters do not exist. Another point of concern is that protection zones have not been defined for all the springs used to supply the coastal region with water.

Permanent and significant intermittent water flows are characterised by a very high vulnerability. Lake Šas is extraordinarily valuable and it is also characterised by a high vulnerability. Skadar Lake is highly vulnerable too. Zones of smaller torrential flows across the entire coastal region can be categorised as medium vulnerable. Areas already exposed to exceptionally high and diverse impacts given the extent to which they are developed and numerous pollution sources have relatively low vulnerability.

Economic and social development

Economy of the coastal region makes a significant share of the national economy. As for the tourism sector, the share is predominant. Around 40% of the total number of active companies in the country operates in the coastal zone, while the share of employment is at the level of around 28%. The economic sectors which stand out by their importance for sustainable use of the coastal zone resources are tourism, agriculture (including fisheries and aquaculture) and shipping industry (with ship building). Other activities which by their scope have an important place in the coastal zone economy are trade, construction, road transport and processing industry (small capacities in metals processing, food and chemical industry).

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2 National Strategy on ICZM of Montenegro
As for the number of companies in different sectors, wholesale and retail sale companies are the most numerous ones in the coastal zone (35% of all the active companies in 2011), followed by companies in accommodation and food services sector (15%) and construction (10%). A similar structure applies to employment: the largest number of employed works in the services sector – over 83%. Non-agricultural sectors employ 13.5% while 2.7% of population of the coastal zone is engaged in agriculture. Structure of enterprises and employment indicates a relatively low level of economy’s diversification which, along with a pronounced seasonal character of tourism (more details under 2.5.3) has significant implications for balanced and sustainable use of natural resources.

The coastal zone is economically the most developed part of Montenegro. A somewhat higher activity rate (51.6% or 1.5 percentage points above the national average) and a lower unemployment rate (8.4% or 11 percentage points below the national average) are in correlation with a higher degree of economic development of the region compared to the rest of the country. In the period from 2006 to the end of the decade, the region annually attracted about one third to a half of direct foreign investment. A major share of investment (particularly in the period 2006 – 2009) was linked to real estate transactions. Beside economic effects, this generated important pressures on space and other coastal zone resources and has (together with the negative trends from 1990s) to a certain extent diminished potential for sustainable tourism development with more substantial and longer term economic and social benefits.

From the aspect of sustainable use of natural resources, insufficient support to rural development and small and medium-sized enterprises represents a problem. Incentives for new technologies, innovation and research, as well as for cluster development, are also insufficient to ensure efficient and balanced use of resources, with better economic and social effects and lower negative impacts on the environment.

**Agriculture**

Due to favourable natural conditions, agriculture represents a significant development potential of the coastal zone with good conditions for production of Mediterranean fruits, olives and vegetables. Mountainous terrains in the coastal hinterland are suitable for ruminants breeding, and they are rich in honey, aromatic and medicinal herbs, as well as in wild fruits.

Official statistical data, however, show that only 24% of the total agricultural land in coastal municipalities is cultivated (51,017 ha is available, including pastures) on some 4,800 agricultural estates where, in addition to owners, around 3,800 people work. To many of these persons, agriculture is an additional or temporary activity, and the number of those formally employed in the agricultural sector, forestry and fisheries is 36,446. It is necessary to mention that expert analysis of the coastal zone’s attractiveness and suitability for agriculture indicted that available areas with agricultural potential are greater than those listed in the official statistics. As many as 90.5% of agricultural holdings in the coastal zone are smaller than 2 ha, while more than 55% of holdings use a surface of less than 0.5 ha of agricultural land. Total irri-
gated area in the coastal zones amounts to 721 ha only. Present policies highlight the important role of agriculture and its potential to contribute to tourism development and preservation of traditional Mediterranean agricultural practices, as well as to increase of household income. The fact that agriculture, forestry and fisheries make 8% of the national GDP also confirms the sector’s importance.

Considering spatial particularities, tradition and market demands, the three key agricultural sectors (important also for economic development on the national level) in the coastal zone are olive and citrus growing and viniculture. Analysis of the coastal zone from the aspect of its suitability for agricultural development has determined that total area of suitable agricultural land amounts to around 44,600 ha. Out of this amount, the area which is suitable for all the three key cultures (olives, citrus and grapevine) amounts to 21,200 ha, whereas total surface of the optimal area for their cultivation is around 18,800 ha.

Montenegro is a net importer of food. In 2013, the share of agricultural products in total imports was 25.7%, while their share in total export was 16.8%. In comparison with EU countries, Montenegrin products mainly belong to the category of highly priced products. Still, some products have relatively lower prices (wine for example), and thus greater competitiveness. Data about import of large quantities of products which can be produced in Montenegro is worrying (e.g. water). Imports of olive oil as a traditional product exceed exports by 10 times. Another problem lies in the fact that potential for placing domestic products on the tourist market is not used to a significant extent.

Particularly important for sustainable development of the coastal zone of Montenegro is integration of valuable parts of the coast with the surrounding rural areas in their hinterland (rural open spaces) which due to their natural, landscape and other values should remain in their natural state. Rural areas are especially valuable spaces both in economic and ecological sense. They need to provide for the overall production of food and other renewable natural resources for meeting the needs of population, while also having an important role in preserving the quality of natural environment. At the same time, they are irreplaceable oases of social and cultural diversity and have a special importance and value in the overall development of the country. Rural areas and their population maintain diversity and ingenuity of millennium long tradition of co-existence of man and the nature. They live slowly, remember long, maintain tradition, keep homeland symbols and develop a feeling of belonging to a place.

Potential of rural development in the coastal zone can be clearly seen from the data on at least 10,000 ha of cultivable agricultural land which is not used, more than 10,000 officially unemployed in the coastal zone and imports of agricultural products where around 3 million € are used annually for imports of olive oil and citrus only.

**Fisheries and aquaculture**

Fishing is one of the traditional sectors of Montenegrin economy which is currently exercised in fishing areas of the coastal zone and the Skadar Lake. Total value of the fisheries sector is 7.4 million €. Not counting aquaculture and fish processing, the sector employs around 400 people (on permanent
and fixed-term basis). Although the share of fisheries in the national GDP amounts to not more than 0.5%, it has an important sociological and cultural role.

Scientific assessments of marine fish stocks are carried out within the framework of the National monitoring programme of the state of demersal and pelagic resources, as well as within international projects (FAO Adriamed, Meditas and Medias). Based on these estimates, annual number of permits for commercial marine fishing is proposed.

Generally speaking, fish stocks in the Mediterranean and in the Adriatic alike are near the point of overfishing, and greater attention should be paid to their preservation. Registered catch of sea fish in Montenegro over the last couple of years was rather modest and amounted to 700 - 800 t per year. Due to a lack of comprehensive supervision and control at sea, non-allowed entries of foreign fishing boats into territorial sea of Montenegro have been evidenced, and the same applies to cases of illegal and unregistered fishing on the national level.

Shell fish production amounts to some 200t annually (it takes place at 17 location in the Boka Bay), while production on fish farms is around 120t.

Even though official data show that fish and shell catches and farming are at a rather low level, examples of unsustainable fishing and increased environmental pressures are nevertheless present.

Fish consumption in Montenegro is among the lowest in Europe (around 4 kg per capita). Fish prices are high and substantially higher than in countries of the region and other parts of Europe. Almost 13 million euros are spent annually on imports of fish and fish products. Causes to such situation lie, among others, in a relatively small size (101 vessels in total) and old age of fishing fleet (on average older than 30 years), as well as in a lack of organised buying out and processing of fish. A lack of a fishing harbour or separate space for fishermen within the existing harbours represents a major problem. Port taxes in certain harbours are quite high, and in the summer months there is not enough space due to a large number of yachts and luxury boats, so fishermen are forced to keep their vessels at anchor. This is why development of fishing harbour(s) is a priority, as is establishment of places of the first disembarkation and first sale (all municipalities in the coastal zone should have designated places of first disembarkation and first sale). Lack of such places additionally impedes performance of inspection supervision and control of catches.

To overcome the existing state in marine fisheries and aquaculture, support to strengthening and modernisation of fishing fleet, and improvement of competitiveness and efficiency of aquaculture while preserving fish and other marine organisms’ resources, is envisaged under the current plans. Adequate siting of fish and shell farms is an important precondition for sustainable use of coastal zone resources and in that sense the importance of maritime spatial planning (which is for the time being only applied at the level of certain pilot activities) stands out. Open sea is not used for fish farming at all, and locations suitable for such and activity have not been identified so far (it is expected that the new SPSPCZ MNE will determine 10 locations in the open sea suitable for this kind of activity).
Tourism

The coastal zone, known for its natural values and cultural heritage, is of special importance for tourism development. Over the last couple of years, more than 95% of the total tourist turnover in Montenegro (measured by overnight stays) took place in the coastal zone. At the height of the season, the monthly number of visitors exceeds 450,000 (three times more than the number of inhabitants of the coastal municipalities).

Total contribution (direct and indirect) of tourism to Montenegrin GDP is around 20%, and to employment 18% (or, applied to the total number of the employed, around 30,500 people). Some of the key characteristics of the season 2013 were an increase in the number of tourists in the period before and after the main season, as well as the increase in the number of tourists from the European Union by 4% compared to 2012. Investments in tourism amounted to around 208 million € in 2013 comprising 28% of total investments. The World Travel and Tourism Council (WTTC) optimistically predicts that revenues from tourism will grow at an average real annual rate of 8.6% over the next ten-year period, while employment (directly or indirectly) generated by tourism will grow at a rate of 5.8%. This ranks Montenegro as the first among 184 world countries based on indicators of the speed of tourism development by 2024.

Coastal zone tourism is characterised by high seasonality. Average occupancy of accommodation capacities is small and amounts to around 16%, which translated into number of days means that the bulk of tourism turnover takes place within 58 days. Average occupancy of hotels with 4 and more rarely exceeds 45% which can be considered as a limit value for sufficient investment return. Although a trend of slight increase in occupancy rates is evident, it can be concluded that the growth in the volume of tourism is completely a result of accumulation of capacities which operate solely during the main season. Accommodation capacities of the coastal zone in the last 10 years have doubled to more than 160,000 beds. Out of this number, 74% goes to private accommodation (121,222 beds). Number of beds in private accommodation has increased by around six times over the last decade.

Total revenues from tourism in 2013 amounted to €721 million, which is 3% more compared to 2012. In the first eight months of 2014 the revenues were €634 million, which makes an increase of 2.2% compared to the same observed period of the previous year. Positive developments have been recorded for other parameters of tourism turnover as well, which represents continuation of the stable growth trend.

Nautical tourism and cruise ships visits are also on the increase. The number of foreign vessels visiting Montenegro substantially increased in 2013 in comparison to 2012 – from around 3,000 to 3,800 (with around 15,000 visitors), almost a half of the vessels being motor yachts. The number of visitors on round-trip cruise ships increased from a bit more than 244,000 to 315,000 (from 409 cruise ships). Tourists from round-trip cruise ships create significant pressures on the sea and port infrastructure of Kotor (where these ships dock) and its surrounding. Although they are considered important, there are no precise estimates of economic benefits of this kind of tourism for local and national economy.
**Maritime transport and ship building**

In the area of maritime transport (short-sea shipping, including ro-ro), services are provided by two big national companies – Barska plovidba ad and Crnogorska plovidba ad Kotor – and around a hundred of small companies that provide local transport services. Transport of goods and passengers on overseas lines has been on the decrease over the last years. In 2012, around 109,000 t of cargo and around 53,000 passengers were transported. Maritime fleet was enlarged with two new ships (with the capacity of 35,000 DWT each) in 2012, but it still has a modest capacity.

The most important port is Bar with around 3,500 m of operating coast, and capacity of around 5 million tonnes of freight, while other ports have substantially lower capacity. The port of Bar is a transit centre of regional importance. It is not equipped with infrastructure required for ports of international importance. The ports of Zelenika and Kotor have for years represented important maritime centres in the Boka Bay. Recently built berth for mega yachts Porto Montenegro has become a new tourist symbol of the country. Bijela Shipyards is equipped for reparation and reconstruction of all kinds of vessels with the capacity up to 120,000 DWT. The shipyard is also equipped for construction of smaller navigation objects such as different-purpose barges, pontoons, work platforms and the like.

Ports do not have equipment for reception and treatment of oily water and solid waste from ships. Due to insufficient equipment and inadequate environmental management procedures, ports and Bijela Shipyards generate significant pressures on the coastal waters and sediments.

**Developmental and demographic characteristics of the coastal zone**

Measured by development index, five municipalities of the coastal region (Budva, Kotor, Herceg Novi, Tivat and Bar) belong to the group of the most developed municipalities in Montenegro, with the development index of more than 125% of the national average, while the development index of the municipality of Ulcinj is 75% of the national average.

The coastal zone is considered an attractive area for life and work which is why over the last 50 years constant migration has been registered from the north and central parts of the country towards the coast. Over the last couple of years, influx of foreign citizens has also been recorded. According to the Population Census from 2011, the number of inhabitants in the coastal zone was 148,683 (close to a quarter of the total number of inhabitants in the country), which means that the average population density was 93 inhabitants per km\(^2\). Population projections by 2020 from the Spatial Plan of Montenegro foresee an increase of around 7%, which would bring the total number of inhabitants in the coastal zone to around 160,000. According to population projections for the Mediterranean, growth rates are higher (over 20% until 2025 compared to 2005).

Population density in certain coastal settlements in the municipalities of Herceg Novi Tivat, Kotor, Budva and Bar exceeds 1,000 inhabitants per square kilometre. Data on migrations within the coastal zone itself shows a pronounced trend of depopulation of rural areas and concentration of population in the settlements on the sea coast. Age of
population, educational level and other parameters which define available human resources are exceptionally unfavourable in almost all the rural area of the coastal zone, particularly in the municipalities of Bar, Ulcinj, Herceg Novi and Budva.

Index of demographic resources speaks about capacities of a community (in this case about capacity of settlements in the coastal municipalities) for endogenous development i.e. development based on local initiatives and internal social potentials of the given community. Generally speaking, endogenous development is considered more sustainable and socio-culturally more acceptable. However, in the situation of weak demographic resources, improvements are less probable without external incentives, be it from public, civil or private sector through new investments. Such development, which is mainly exogenous, brings problems which should be considered both in development and in spatial planning.

Involvement of social actors in decision-making processes and public administration efficiency also represent important social development factors. Over the last couple of years, an improvement in these areas is noticeable, but there is still significant room for improvement, particularly when it comes to public participation and access to information, balancing of different interests, public administration capacities and the like.

5.1 Assessment of land-based sources of pollution and activities

As it is specified in chapter 3.1 EO5 defines 6 GES targets, EO9 5 GES targets and EO10 15 GES targets. The commitments under SAP-MED and the Regional Plans/Decisions for each ecological objective that are expressed through another set of targets contribute to fulfilment of all related EcAp GES targets. The links are quiet strong and with respect to the discharge of key pollutants to coastal waters from municipal waste water and industrial development are expressed through SAP/MED and Regional Plans requirements. So the midterm baseline assessment provides description of key pollution discharges by providing assessment of pollution trends, pollution pressures and impacts on marine and coastal ecosystems. It also provides the overview of the policy, institutional and legislative status with regard to the fulfilment of the legally binding requirements of SAP/MED and Regional Plans.

5.1.1 Discharge of key pollutants to marine environment under EO5 and EO9 for the SAP-MED sectors of municipal wastewater and industrial development

With regard to EO5 GES targets SAP/MED requires: promotion of separate collection of rain waters and municipal wastewaters, promotion of reuse of treated effluents for the conservation of water resources, prescribe obligation that coastal cities and urban agglomerations of more than 100,000 inhabitants are connected to a sewer system, but also the necessity to reduce nutrient inputs, from agriculture and aquaculture practices into areas where these inputs are likely to cause pollution and to enable disposal of all wastewater from industrial installations which are sources of BOD, nutrients and suspended solids. Regional Plans define more demanding legal requirements as to make prevention of direct and indirect effects of nutrient over-enrichment in the marine environment until 2015, to limit concentrations of key nu-
trients in the marine environment to levels which are not conductive to eutrophication by 2015, to provide that industrial Food Plants which discharge more than 4 000 PE into water bodies shall meet the following requirements: COD 160 mg/l or TOC 55 mg/l and BOD 30 mg/l, as well as to take necessary measures to establish adequate urban sewer and wastewater treatment plants that prevent run-off and riverine inputs of litter.

- With regard to above specified SAP/MED and Regional Plans the status of their implementation in Montenegro is assessed as follows:

With regard to nutrients inputs from waste waters, it is important that Master Plan for Waste Water Treatment in the Coastal Area of Montenegro and Cetinje Municipality (2004-2029) stipulates the construction of WWTPs for all settlements in the coastal area. It is the most important technical measures to limit nutrient inputs. According to the 2011 census, the biggest municipality in the coastal area is Bar with 42,048 inhabitants, followed by: Herceg Novi (30,846 inh.), Kotor (22,601 inh.), Tivat (14,031 inh.), Budva (19,211 inh.) and Ulcinj (19,218 inh.). All municipalities in the coastal area are connected to the sewage network to a certain degree, so that the share of population connected to the sewage network amounts to: H.Novi with 75%, Kotor 45%, Tivat 40%, Budva 100%, Bar 65% and Ulcinj 75%. The official determination of the agglomerations according to the Directive 271/91/EEC is not finalized. By using available agglomeration maps that are preliminary prepared until now for the purpose of NAP’s preparation it may be conclude there is a number of agglomerations with more than 2,000 inhabitants, but none of them exceeding 100,000 inhabitants. The implementation of the Master Plan is planned to connect most of villages to the sewerage system and WWTP till 2023.

- The strongest pressures to marine ecosystem are generated by wastewater from many sewage outfalls which function without wastewater treatment, and from absorbent cesspits, which introduce a great amount of nutrients (NO$_2$, NO$_3$, NH$_4$, PO$_4$), with contents changing throughout the year. In the period between July and October, the concentration of nitrogen compounds significantly exceeds the limit for A3 quality class, according to the Decree on classification and categorization of waters (Official Gazette of Montenegro 02/07). The number of tourists during the summer increased by more than 10 times the population. There is also pressure from pollution coming from dumps close to the sea, wastewater from small plants and wastewater from ships, as well as the inflow of nutrients from the Bojana River.

Therefore the Strategic Master Plan for the Wastewater Management in the Coastal Zone of Montenegro and Cetinje Municipality (2004-2029) stipulates that sanitary and rainwater should be collected and discharged separately, as well as the separation of sewage and atmospheric waters where such separation hasn’t yet been implemented or where the system has been damaged due to subsequent connections of illegally built structures. The Law on Waters and the Master Plan stipulate a re-use of treated effluent, after the construction of wastewater treatment plants, including the inspection of areas where such effluents could be used for irrigation purposes.
- There are not industrial installations which are sources of BOD, nutrients and suspended solids. BOD emission from the shipbuilding industry, according to data from the 2013/2015 NBB, amount to 7,28t/year and that is not a dominant source of pollution with BOD.
- In the coastal area of Montenegro there is no intensive agricultural production, neither does exist the drainage of waters from agricultural surfaces into river streams or the seawater. Aquaculture may impose significant quantity of nutrients but any available data are not available since there is not monitoring of this sort of pollution emission. In accordance with 2013/2015 NBB the coastal region has 52,768 ha of agricultural land, of which about 5 666 ha meadows, which makes 10.2% in relation to Montenegro. Dominant is the olive (Bar and Ulcinj), the production of citrus fruits (Bar and Ulcinj) and slightly less, horticulture (Herceg Novi, Kotor, Tivat), fruit production (Tivat, Bar, Ulcinj), milk (Ulcinj). Field of Grbalj, Field of Ulcinj and Field of Bar are additional agricultural land. In the process of transition the state-owned companies were closed (as Agroulcinj, Primorka, PKB Herceg Novi) while there is a trend of intensive conversion of agricultural land in the urbanized land. Today’s agriculture is characterized by individual production. The amount of used plant products is not known. Given the structure and volume of agricultural production as a source of pollution of coastal waters, it can be said that this sector is not of greater interest.
- In the coastal area of Montenegro there are no industrial food plants with more than 4000 PE (calculation of wastewaters pollution load from food industry was done within the 2013/2015 NBB). Capacities of the meat industry Pantomarket in Zelenika are minor, and wastewaters are drained into the city sewage system. This way it has an impact on marine ecosystem considering that the wastewater treatment plant has not been yet put in function. In accordance with the 2013 NBB emissions of BOD from the baking industry Alexandria is 2,68t/year, and from production of olives is around 0,153t/y, while for the meat industry Pantomarket there is no data. All of these industries have capacities significantly less than 4000PE. The Rulebook on the quality and sanitary-technical conditions for waste water discharge into the recipient and public sewage system, method and procedure of testing waste water quality, minimum number of tests and the contents of the report on the determined waste water quality (Official Gazette of MN 45/08 and 9/10, 26/12 and 56/12) does not specifically stipulate conditions for food industry. However the norms prescribed in this Rulebook are somewhat stricter than required by the Regional Plan on the Reduction of BOD from Food Sector (Decision IG 20/8.2) and Utility Wastewaters (Decision IG 19/7).

A number of impacts to marine ecosystem correspond with above described situation, out of which the most important may be presented as follows:

- In the locations outside the Boka Bay, the highest exceeds of permitted levels for monitored parameters and chlorophyll-a were mostly recorded in October, whereas in the Boka Bay, the maximum
values for nutrients were recorded in August and September, and chlorophyll-a in April (spring algae bloom).

- When eutrophication marks per each location are analysed, it can be concluded that the location in Dobrota near the Institute of Marine Biology is most endangered, and is classified as extremely eutrophic based on the amount of chlorophyll-a, and the water quality was classified as “bad” according to the Trix index (6.05), due to the high contents of TN and TP. Risan has been classified as eutrophic, due to high concentration of chlorophyll-a. *In almost all locations in the Bay, the growth trend of chlorophyll-a can be recorded, which is directly connected to the increase of concentration of phytoplankton and the increase of eutrophication level.*

- The Port Milena location in Ulcinj is a hot spot location from the point of view of organic pollution, and it is an extremely eutrophic area. The water quality monitoring results, and the researches implemented by CETI, show that water in Port Milena is characterized as municipal wastewater since the oxygen content is at around or <5.0 mg/l, COD to 279 mg/l, BOD5 from 7-9mg/l- 125 mg/l, NH₄ from 1.5-3.48mg/l, Pb-2.0 mg/l, NO₂ - 0.073 mg/l. This is confirmed by the analysis of mud from Port Milena which can be classified as sewage sludge (data: CETI 2007-2013).

As listed in table in chapter 3.1, with regard to EO9 GES targets SAP/MED requires: to apply the BAT and BEPs for environmentally sound management of POPs; to enable that concentration of priority contaminants in biota, sediment or water is kept within acceptable limits; to phase out inputs of the 9 pesticides and PCBs and to reduce inputs of unwanted contaminants: hexachlorobenzene, dioxins and furans; to phase out to the fullest possible extent discharges, emissions and losses of organomercuric compounds and reduce those of organolead and organotin compounds; to phase out inputs of PAHs; to eliminate to the fullest possible extent pollution caused by discharges, emissions and losses of organohalogen compounds; to eliminate to the fullest possible extent inputs of radioactive substances; to dispose all hazardous wastes in a safe and environmentally sound manner; to safeguard of the ecosystem function and to maintain the integrity and biological diversity of species and habitats; to restore marine and coastal habitats that have been adversely affected by anthropogenic activities; to phase out discharges and emissions and losses of mercury, cadmium and lead; to phase out discharges and emissions and losses of mercury, cadmium and lead; to eliminate to the fullest possible extent pollution of the Mediterranean Sea caused by discharges, emissions and losses of zinc, copper and chrome.

Regional Plans further require: more demanding legal requirements as to identify stock piles consisting of or containing POPs; to minimize the effects of released contaminants to the marine environment such as not to give rise to acute pollution events [Deadline 2015]; to prevent acute pollution events and minimize their impacts [Deadline 2015]; to identify existing sites which have been historically contaminated with mercury; to apply environmentally sound management measures to sites which have been historically contaminated with mercury; to achieve environmentally sound management of metallic mercury from the decommissioned plants; to progressively reduce total releases of mercury (to air, water and to products) from existing Chlor alkali plants until their final cessation; to take appropriate measures to isolate and contain mercury...
containing wastes and to ensure that water quality in bathing waters and other recreational areas does not undermine human health [Deadline 2015].

With regard to above specified requirements of SAP/MED and Regional Plans, the findings on pollution trends are as follows:

- Organochlorine compounds: POPs (Aldrin, dieldrin, endrin, DDT, DDE, Heptachlor, HCB, Toxafen, Mirex, PCBs, dioxins and furans dl-PCBs) were not found in the surface waters and in the sea in any of the monitored locations in the monitoring period 2008-2014.

- In the Porto Montenegro locations (location of the former Ship Overhaul Institute) and the Shipyard in Bijela level of pollution with: Pb, Zn, Hg, Cu, Cr, Ni, PAHs, TBT, and PCBs and PAHs exceeded significantly the maximum permitted concentrations according to CEFAS and MPC Netherlands (EU) standards, even the ones prescribed for dredging.

- The sediments in other locations: Ada Bojana, Port Milena, port of Risan and Herceg Novi are contaminated with heavy metals and POPs in significant quantities when compared to EU norms.

- Shellfishes in all locations (except for Orahovac and Solila) contain an increased concentration of Pb, Cd, Hg, Zn, PCBs, OTC, OCP and PAHs compared to the EU standards. Shellfishes in the area of the former Overhaul Institute also have a high content of As and furan.

- There is a downward trend when it comes to content of PCBs and POPs pesticides in the sediment and shellfishes, as well as downward trend of hazardous substances, in 2014 as compared to 2008, although there was no monitoring in the past three years. Monitoring did not show a high level of entry of HCB and dioxin and furan in the marine ecosystem.

- In some locations the presence of priority substances is still a great concern (hot spot locations in Bijela), as well as in the locations endangered with the high organic pollution, such as locations of IBM- Kotor and Port Milena in Ulcinj.

- The total content of heavy metals Pb and Hg and content of organotin compounds – OTC: MMT, DMT, TMT, TeMT, HMT, DBT in water, sediment and biota are monitored although it is not obligation that is stipulated in national decree or rulebook. Increased content of Pb in sea water was registered in the locations in Tivat until 2011, and since then, the water at that location is A1 class. Hg content in the Porto Montenegro location in Tivat, and in the Port of Tivat was 3 times higher than MPC (maximum permitted concentration), as well as in the Bijela Shipyard, in 2009, 2010 and 2011. Content of organotin compounds - TBT (tri butyl tin) in the water at the location of the Institute for Marine Biology in Kotor, the Port of Risan and Herceg Novi is at the level of A3 class, and in Porto Montenegro and Bijela Shipyard concentrations exceed the prescribed ones for A3 class and from the MPC according to the Dutch norms. In the sediments in Tivat (the port and the former Arsenal), as well as in the Bijela Shipyard, Pb content was more than 10 times higher than MPC in the Netherlands, and Hg in both locations was higher than the intervention level 2 Cefas. Content of TBT in sediment in Tivat and Bijela was 2 to 5 times higher than MPC in the Netherlands or the intervention level 2 Cefas. Emission through direct entry of organotin compounds of Hg and Pb in the marine environment from industrial plants in Montenegro does not represent a problem and will be fully eliminated by 2016.

- There are increased PAH concentrations - they are established on almost all locations where sea-water monitoring revealed concentration higher
than A2 water quality class. Particularly high concentrations can be found in the ports of Kotor, Tivat, Budva and Bar. PAH concentrations in the sediments are particularly high in Bijela Shipyard (22x > of Defra norm) in 2009. High concentrations in sediments can be found in the ports of Tivat, Bar and Budva, as well as in H. Novi, above Cefas norm. Shellfish from all four farms that were tested in 2014 had the increased PAH concentrations. They were 3.5 to 7.4 times higher than MPC (required MPC for shellfish is 0.01 mg/kg).

Monitoring of radioactivity of the environment in Montenegro has been implemented permanently since 1998 by the Ecotoxicological Examination Centre (CETI d.o.o.). The level of radioactive contamination by artificial radionuclides has been constantly on a decrease since the Chernobyl disaster. All the tested water and sediment samples, as well as the samples of biological material, were on the level of natural and below the permitted levels.

The habitats of Posidonia oceanica and other sea flowering plants have a decreasing trend due to the impacts of pollution pressures from the land and sea, as well as due to the reduction in the biomass of the fish stock, particularly of commercial breeds. Trends of other biocenoses are insufficiently examined. The number of invasive species has been increased. There are no established protected areas in the sea, although the current spatial planning documents sets out the locations. No locations have been envisaged for SPAMI.

There is no site for permanent disposal or safe destruction of hazardous waste in Montenegro. Neither the issue of the industrial hazardous waste, nor the issue of collection and destruction or recycling of hazardous waste from household or services (batteries, paints, solvents, used oils, etc.) have been solved, which is an additional burden for the environment. Quantities of hazardous waste from industry and households increase in line with the pace of production of hazardous waste:

- In Porto Montenegro there is a closed building where there are 3,500 m³ of grit and 259t contaminated soil stored, while under the seabed of Porto Montenegro marina there are 8,330m³ of used grit, deposited in the sea in the past period.
- In the location of the Bijela Shipyard in the closed plastic bags there are 64,000 t grit (according to 2013/2015 NBB) declared to be hazardous waste and 5,500 t of non-hazardous waste. Each year Shipyard produces more about 2,500t and 160 t of used heavy fuel oil.

With regard to identification of stock piles consisting of or containing POPs, there is evidence of the amounts of PCB waste and equipment contaminated with PCBs that is in use in coastal area, as follows:

- Enterprise Hemosan Ltd. (which performs the activity of collecting and export of hazardous waste in accordance with permits issued by the Environmental Protection Agency)
  - Waste transformer oil containing PCBs with a total mass of 2,160 kg;
  - In the warehouse of company Hemosan Ltd. there is and 18,000 litres of PCBs oil that were collected from the other legal entities in the total weight of 27,900 kg (oil for insulation and heat transfer containing PCBs with a code from the Waste Catalogue 13 03 013).
- Railway infrastructure of Montenegro

³Label for PCB in Waste Catalogue
- 4 waste transformers that are mass at 27.5 tons (110 tons total) of which 9 tons of transformer oil (total 36 tons). Determining the nature of used oil containing PCB is on-going, but the concentration is below 50 mg / litre.
- Shipyard "Bijela"
  - 20 transformers containing PCBs: from a total of 20 transformers (19 of them in operation) for them 9 was carried out analysis - in the three transformer oil with PCB, and the other 6, the concentration of PCBs in oil was below the threshold; for the remaining 11 transformers accredited laboratory CETI would determine whether PCBs is contained in them. The total weight of transformers with PCBs is 13,039 kg.
  - 104 capacitors containing PCBs of which 54 are operational and 50 are not. All capacitors are of the same type and manufacturer (KMPK 5003 - Iskra Semič). In the coming period capacitors will be determined by examining whether a PCB equipment. The total weight of capacitors with PCBs is 4,530 kg.
- Port of Bar
  - 4 transformers with PCBs in total weight of 9,600 kg and 28 capacitors with PCBs in total weight of 2,240 kg.
  - Container Terminals as the privatized part of the Port of Bar:
    - 13 transformers in which the oil containing PCBs in total weight of the 31,200 kg: Of the total number of transformers 10 of them in operation, and 3 transformers are functional and are in temporary storage.
    - 36 capacitors in which the oil containing PCBs are currently not used, but they have not dismantled in total weight of 31,200 kg.
- Data from the National Inventory Report EPA for 2010 indicate that in Montenegro in 2010 emitted 22.34t of unintentionally created persistent organic pollutants (estimated emissions) of which is 4.22g ITEg⁴ PCDD / PCDF, 0.01 t HCB and, 0.001 t PCB.
- In the laboratory, the former Overhaul Institute Sava Kovačević in Tivat (now Porto Montenegro) there were substantial quantities of chemicals and various chemical compounds (concentrated inorganic acids, cyanides and the like) in amounts of approximately 15,000 kg, which is in accordance with the Basel Convention exported in Vienna, where destruction-neutralization was done.
- In the coastal area of Montenegro there is no production of chlorine that would use mercury as a catalyst. There is no location with "historical" pollution with mercury and its compounds. The present contamination of water and its sediments with mercury developed indirectly in the locations where ship refurbishment was done or through the influence of waste from households. So far 48,160 kg of mercury-contaminated soil has been exported from the Ship Refurbishment Facility in Tivat (previous Overhaul Institute “Arsenal”) during the construction of Porto Montenegro. The presence of mercury in the contaminated sediments in the Porto Montenegro marina originates from the 8,330m³ of used grit deposited in the marina during the operations of the Ship Refurbishment Facility.

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⁴ International unit for toxicity
Reporting on monitoring of sea water quality in bathing areas is done every 15 days after receiving the results of analysis, and the data are available on the website of the Public Enterprise for Coastal Zone Management and on EPA's website as well, and published in the media. The bathing areas which meet the best ecological requirements on beaches and have the best permanent quality of bathing water (K1) hold "Blue Flag", the international award for the quality of beaches. It is the obligation of holders of this award to make available, on a visible place, current results of the water quality and other important information about the bathing area. Profiles are mandatory for all beaches.

Based on the data collected so far, it can be concluded that the number of beaches with satisfactory water quality under the prescribed category K1 ranges between 67.5 and 97.5%, and the number of locations which meet the prescribed class K2 ranges between 2.5 and 15%, while the number outside classes ranges between 2.5 and 15%, depending on the year and season, which is high.

The level of pollutants and pollution trends above presented generate significant pressures to marine environment. The most important source of pressures and some of consequences of such pressures are listed below:

- Ship blasting in the Bijela Shipyard, as well as technological and working processes in ports, marinas, services, etc., generate pollution of the marine environment with waste substances.

- The entry of contaminants through local sewage drains that are mostly connected with the atmospheric sewage, washing off the waste from the surrounding surfaces and roads induce significant pollution pressures.

- Entry of contaminants by inflow of fresh water during winter season from the inland (possible impact of the undeveloped/unregulated landfills) causes pollution impacts.

- Pollution caused by the entry of POPs through the untreated municipal waste water and through the river flows of Bojana and Sutorina River, as well as some smaller rivers in the Kotor Bay, is evidenced through their presence in the sediments.

- It is also important to take into account pollution that is generated through the emission of pollutants into the air from forest fires, combustion gases from passenger and freight vehicles, as well as high power cruisers while anchored in ports as the biggest producers unintentionally created POPs (HCB, PeCB, PCDD, PCDF), as well as NOx and PM10 and PM2,5 the immediate surroundings.

- Improper solid waste disposal in the areas close to the sea induces pollution pressures.

- Pollution due to accidents on the land and sea (accident in Bijela, Bar) is another potential source of pressures. Special risk is posed by the Port of Bar with warehouses of hazardous chemicals, oil derivatives and bulk.

- It is also important to note the risks from pollution caused by accidents that result from floods, due to unregulated river and torrent flows in the coastal area (e.g. floods in 2010 had a cross-border impact on the sea waters of the Republic of Croatia).

- As a result of long-lasting pollution with grit
and other waste during ship repairs, there is pollution with high concentration of Pb, Hg and OTC in the waters and sediment in the locations of Porto Montenegro and the Bijela Shipyard. Depth of land pollution in Bijela Shipyard goes up to 8 m, including layers with PAHs and mineral oils. Pollution in Tivat is reduced following the partial remediation of the location through the construction of the marina and tourism facilities in Porto Montenegro.

- There are also pollution impacts through the combustion of oil derivatives in industry and transport that can come into the sea by water washing off, deposits from air or directly through discharge of gasses or oil products into the sea. Pollution caused by the emissions that come as a consequence of forest fires in summer and heating in winter in the coastal area need to be taken into account.

- Pollution with PAH in the Port of Bar is also higher due to the pollution of the sea with oil derivatives in the process of tanking and decanting of oil and derivatives from the ships to the tanks on the coast, as well as occasional accidents.

- There are no measurable influences of the radioactive contamination on the marine eco-system in Montenegro.

- Pollution burden due to the anthropogenic impacts from the land, but also from vehicles, which causes changes in the physical and chemical parameters of water.

- As to improve status of beaches it is necessary to address waste water discharge and treatment, disposal of solid waste into the sea, etc., and to prevent declining in the quality of sea water (St. Stasije in Kotor, Villa Galeb and Blatna Beach in Herceg Novi).

Out of a numerous impacts generated with pollution pressures mid-term assessment singled out the following ones:

- Increased content of PCBs and POPs was found in mussels in the breeding locations near the Shipyard in Bijela and Porto Montenegro, as well as the Port of Kotor.

- Impact of high concentration of Pb, Hg and OTC compounds involves increased concentration of Pb and Cd (approx. 2 times) in shellfishes from the locations in and close to the former Arsenal location. Until 2010, shellfishes in the location of the Bijela Shipyard had an increased content of Pb, even up to 10 times > than MPC. After the 2010, concentration of heavy metals in the shellfishes was within the prescribed standards, except for TBT content which is above MPC (in accordance with the EU norm). The high content of organometallic compounds, primarily organotin compounds can affect the change of sex in shells and their disappearance.

- Monitoring of bio-indicators (fish and shellfish) recently implemented indicates accumulated PAHs in the tissue of fish and shellfish, particularly in the location of the port of Kotor (2-12 times >MPC), Tivat Bay (2-5 times > MPC) and location of the Shipyard in Bijela (22 times > MPC).

- Impact on the pollution of the sea and sediments, of groundwater and soil in the vicinity of the hazardous waste disposal site, as well as the impact of pollution to the air quality in the surroundings are obvious in every of the listed locations of the old industrial disposal sites.
- All above recognized impacts cause certain changes of the type and number of habitats, in the land and in the sea, changes in the biological species both in numbers and in representation, entrance of non-autochthonous invasive species.

**5.1.2 Generation and disposal of marine litter under EO10 for the SAP-MED sector of solid waste**

With regard to EO 10 SAP/MED and Regional Plans requires: reduction of waste at source, separate waste collection, recycling, composting and environmentally sound disposal in all cities and urban agglomerations exceeding 100,000 inhabitants and areas of concern; reduction of fraction of plastic, packaging waste that goes to landfill or incineration, to ensure adequate urban sewer systems, WWTP and waste management systems to prevent run-off and riverine inputs of Marine Litter; application of cost effective measures to prevent any marine littering from dredging activities, to adopt preventive measures; to minimize inputs of plastic in the marine environment; to enable regular removal and sound disposal of accumulations/hotspots of marine litter; to enable reducing/reusing/recycling measures in order to reduce the fraction of plastic packaging waste that goes to landfill or incineration without energy recovery; closing to the extent possible existing illegal solid waste dump sites; removing existing accumulated litter from 10. SPAMIs, etc.

With regard to above specified SAP/MED and Regional Plans the status of generation and disposal of solid waste and marine litter is characterized with the following pollution trends:

- In the coastal zone, there is only one (1) functional sanitary landfill in Bar, and one temporary sanitary landfill is closed in Kotor (Lovanja). Currently, there is only one planned regional sanitary landfill in Herceg Novi (Duboki do, if the location suitability is confirmed).
- In 2013, only 2.66% of the total collected waste in Montenegro was selected, and out of that 1.4% was subject to primary selection, and 1.27% to secondary selection. According to the goals defined in the Law on Waste, minimum 50% of the total collected waste (glass, paper, metal and plastic) need to be recycled by 2020, as well as minimum 70% of non-hazardous construction waste. The plans are to collect 25% in primary waste selection by 2020. Disposal of biodegradable waste in landfills should be reduced to 35% of the 89% in 2010 and according to the Waste Management Strategy the collection of 95% of the total generated waste should be achieved. Still, available data shows that 100% collection can only be expected after the year 2020.
- Waste management strategic document stipulates the removal and remediation of illegal dumps. In the municipality of Bar there is the largest illegal landfill Cafe, which results in marine litter since it is located close to the coastline. One of the on-going projects involves remediation of the Cafe dump. In the coastal zone about 37 registered illegal dumps have been established for: <100 m³ - 11, 100-1000 m³ - 14, >1000 m³ - 14. The municipality of Ulcinj has only an old landfill with less than 100 m³ of waste. In Kotor there are registered 23 illegal dumps, of which 6
are larger than 1,000 m$^3$ and majority of them is along the old road Risan-Nikšić, highway Lipci-Prince lie in Donji Grbalj next to the industrial zone. In Budva there are three large landfills with over 2,000m$^3$ of waste and in Tivat 4 landfills, of which 2 large (Lovanja 1 and Grabovac) and 2 less in the way of Radovići. Almost all landfills are beside roads and a disgrace to the environment in addition to polluting the environment.

- Monitoring of marine litter impact has not been included so far in the monitoring of the state of marine ecosystem. Institute of Marine Biology from Kotor implements certain activities, although of a limited scope still, within the scientific research work aimed at identification of the impacts of litter on marine biodiversity.

- Bojana River water level changes by about 3 m during the year, which periodically produces massive flooding and washing marine litter in the sea (as was 2010). There is also occasional excessive pollution in specific locations (Kotor Bay, Port Milena-Ulcinj; to a lesser extent Budva and Bar) during heavy rains flushing waste from the surrounding area.

Due to waste generation impacts there is risk for quality of certain water springs, sources of peloids and thermo-mineral water sources in the Igalo bay that is greatly increased. A particular problem is the channel Port Milena (Hot Spot A) which has been turned into a “septic tank” and landfills and requires urgent rehabilitation measures.

The above status of pollution is generated from a number of sources of pollutions that are listed below:

- Improper waste disposal (contrary to regulations).
- The highest pressure of marine litter generates cross-border river flow of the Bojana River (640 m$^3$/s), as well as the river flow of the Sutorina river. Besides these two, marine litter is also caused significantly by the torrent waters in winter time.
- The construction of facilities in coastal areas increases the risk of an increased amount of waste especially in Igalo because of construction of the area adjacent to banks of the river Sutorina.
- Waste deposit from the land caused by torrent waters and floods in winter time cause significant pressures.
- There is waste accumulation on the coast or in river beds of smaller rivers.
- It is also necessary to take into account pressures to marine ecosystem that are generated with solid and fluid waste (oily and ballast waters) from the ships and boats in ports and jetties.

The above pollution pressures may be associated with a numerous impacts such as:

- harming the ecological status of marine ecosystem,
- harming the sanitary quality of ground water and bathing water,
- reducing sanitary validity of the potable water,
- harming the characteristics of agricultural land,
- threatens hydrological characteristics of river flows,
- cause loss of peloids and quality of ther-
mo-mineral water as well as the change in chemical and physical characteristics of groundwater,
- cause eutrophication of the sea in the Kotor and Risan Bay and in Port Milena,
- burdening sensitive beaches in the Kotor bay and on the coast with waste.

5.1.3 Past and present NBB data on pollution of marine enviroment

NBB tool was agreed by the contracting parties of Barcelona Convention as to track pollution reduction progress. Thus it was applied as the appropriate tool to monitor progress in implementation of NAP measures. It compiles national pollutant discharges to air and water for a large number of pollutants with a 5-year periodicity. Montenegro submitted NBB report in 2003, in 2008 and the last one prepared in 2013 and amended during 2014 and 2015 in order to be used for NAP update.

The number of different sectors and pollutants reported by Montenegro in 2003, 2008, 2013/2015 is presented in Table 2.

Based on the aforesaid comparison of data from the three NBBs, it ensues that the number of analysed sectors and sub-sectors has increased in the last 10 years. However, this piece of data must be also seen in the context of the fact that the methodology used to develop the NBB and calculate the pollution load has been modified, as well as the number of realistically measured data in each of the NBBs, and the method of keeping statistical data. In the previous period, a significant number of large polluters, especially industrial, ceased their operation (MRZ Arsenal in Tivat, Primorka in Bar, Rivijera in Kotor and other smaller plants) or significantly reduced emissions (Daido Metals, Shipyard in Bijela).

Although the number of pollutants and sectors/sub-sectors has increased in the period between two population censuses in 2003 and 2011, there was a relatively small increase in local residents (table 3). However, the number of overnights has been doubled at the same time. These facts proportionately reflect onto the total emission and its impact on the marine ecosystem.

Cumulative values of the quantities of key pollutants discharged to the marine environment from all sectors are presented in Table 4, while total load expressed through quantities of liquid and solid waste are presented in Table 5. Nutrient loads from river discharges represent additional pollution sources in Montenegro. Main source of nutrient loads in the Bojana River are highly impacted by the pollution from the Drin River when it flows into the Bojana River. Therefore the Bojana River is included in the calculation of pollution emissions.

The 2013/2015 NBB is treated as the baseline document for NAP update. Thus it is treated as an annex to this NAP. While the analysis of pollutant emission and load calculation, by activity sectors, harmonised with the LBS requirements, is presented into details in the 2013/2015 NBB, the sum up of the most important findings on loads and concentrations of key pollutants discharged to the marine environment and their trends from 2003 to date, including description of pressures, state of marine environment and impacts, is presented in this chapter of the NAP. Table 6 shows the most important sectors gen-
erating emissions that are elaborated in the 2013/2015 NBB, as well as the recipients and impact assessment.

Pollution Inventory kept by the Environmental Protection Agency was used for the calculation of pollutant emissions in the 2013/2015 NBB. National inventory of waste emission is also kept as part of it. The waste emission inventory had previously been improved since the number of facilities included in the records was increased, and a more precise methodology for calculating emissions was applied. Moreover,

Table 2: Overview of sectors and pollutants analysed in the NBB

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2008</th>
<th>2013/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Sectors</td>
<td>7</td>
<td>6</td>
<td>9 sectors and 6 sub-sectors+ the Bojana River inputs</td>
</tr>
<tr>
<td>Number of Pollutants</td>
<td>24</td>
<td>28</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 3: Comparative data of the numbers of residents and tourists in the coastal zone

<table>
<thead>
<tr>
<th></th>
<th>2013 NBB</th>
<th>NBB 2008</th>
<th>NBB 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>year</td>
<td>number</td>
<td>year</td>
</tr>
<tr>
<td>Tourists</td>
<td>2013</td>
<td>1,208,678</td>
<td>2007</td>
</tr>
<tr>
<td>Overnights</td>
<td>2013</td>
<td>9,126,792</td>
<td>2007</td>
</tr>
<tr>
<td>Increase in population 2011/2003</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in the number of overnights</td>
<td>2013/2011</td>
<td>2013/2003</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>22%</td>
<td>116%</td>
</tr>
</tbody>
</table>

*) Projected number of residents when compared to 2003
data from the 2015-2020 National Waste Management Plan were used for the calculation of emissions of solid and special (industrial and hazardous) waste. Data from the National Implementation Plan for the Stockholm Convention, for POPs pesticides and PCBs were also used. In the sector of air emissions, data from the GHG inventory which is kept by EPA was used. When there was no information on the amount of emissions, or when the emission was presented for the entire Montenegro, additional data of the Hydrometeorological and Seismological Office (meteorological data and waste water quality data), of MON-

### Table 4: Comparative data of pollutant emissions in effluent

<table>
<thead>
<tr>
<th>Type of matter</th>
<th>2013 NBB</th>
<th>NBB 2008</th>
<th>NBB 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LBS</td>
<td>Bojana&lt;sup&gt;**&lt;/sup&gt;</td>
<td>LBS</td>
</tr>
<tr>
<td></td>
<td>t/year</td>
<td></td>
<td>t/year</td>
</tr>
<tr>
<td>TSS</td>
<td>3,490</td>
<td>125,135</td>
<td>3,390</td>
</tr>
<tr>
<td>BOD&lt;sub&gt;5&lt;/sub&gt;</td>
<td>3,814</td>
<td>36,128</td>
<td>3,699</td>
</tr>
<tr>
<td>COD</td>
<td>7,629</td>
<td>52,072</td>
<td>7,398</td>
</tr>
<tr>
<td>TN</td>
<td>761</td>
<td>50,679</td>
<td>740</td>
</tr>
<tr>
<td>TP</td>
<td>190</td>
<td></td>
<td>185</td>
</tr>
<tr>
<td>Municipal solid waste</td>
<td>97,846</td>
<td></td>
<td>50,356</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oils and oiled waste</td>
<td>1,784</td>
<td>1,450 l</td>
<td>898*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>127 m³</td>
<td></td>
</tr>
<tr>
<td>Car batteries and batteries</td>
<td>0.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grit</td>
<td>2,369</td>
<td>3,500 m³</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>25.18</td>
<td>807</td>
<td>-</td>
</tr>
<tr>
<td>Lead</td>
<td>0.38</td>
<td>20 ***</td>
<td>0.185</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.02</td>
<td>6.86</td>
<td>0.017 x 10&lt;sup&gt;-3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.14</td>
<td>-</td>
<td>0.194 x 10&lt;sup&gt;-3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Arsenic</td>
<td>1.1</td>
<td>34 ***</td>
<td>0.47 x 10&lt;sup&gt;-3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tin</td>
<td>0.33</td>
<td>-</td>
<td>0.01</td>
</tr>
</tbody>
</table>
**Table 5: Total quantities of liquid and solid waste**

<table>
<thead>
<tr>
<th>Matter</th>
<th>Measurement unit</th>
<th>2013 NBB</th>
<th>NBB 2008</th>
<th>NBB 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grit</td>
<td>t/g m³</td>
<td>2,369</td>
<td>4,683</td>
<td>13,000</td>
</tr>
<tr>
<td>Used oils</td>
<td>t/g lit/g m³/g</td>
<td>71.21</td>
<td>1,450</td>
<td>326</td>
</tr>
<tr>
<td>Oiled water</td>
<td>t/g m³/g</td>
<td>149,312.7</td>
<td>14,092</td>
<td>5,000</td>
</tr>
<tr>
<td>Oiled solid waste</td>
<td>t/g m³/g</td>
<td>60</td>
<td>90.4</td>
<td>1,183</td>
</tr>
<tr>
<td>Heavy fuel oil (crude oil)</td>
<td>t/g m³/g</td>
<td>160</td>
<td>454</td>
<td>400</td>
</tr>
</tbody>
</table>

*) Quantities calculated as the total hazardous solid waste, following the methodology from the 2004 Master Plan
**) Data source on the contents of pollutants (in 2012): "Integrated Resources Management Plan (IRMP) for the Buna/Bojana Area", Medpartnership, draft (July 2015)
***) Source for 2009: MEDPOL monitoring in 2009, EPA report
STAT, EPA (MEDPOL monitoring), etc. were used.

Ranking of impact of land-based sources of pollution on the marine ecosystem based on estimation related to the impact of individual pollutants is presented in Table 7.

Key findings of 2013/2015 NBB with description of pressures, state of marine environment and impacts, including the comparison of data with the previously prepared NBBs, are presented in the following text:

- The 2013 NBB pollution database provided a more comprehensive list of companies – sources of pollutants compared to the previ-

### Table 6: Overview of pollution from land-based sources

<table>
<thead>
<tr>
<th>Sector</th>
<th>Sub-sector</th>
<th>Enterprise (generates, manages, collects)</th>
<th>Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal wastewater</td>
<td></td>
<td>Public Enterprise for Waterworks and Sewerage (PE WWS)</td>
<td>water</td>
</tr>
<tr>
<td>Municipal solid waste</td>
<td></td>
<td>PE WWS</td>
<td>water, air, soil</td>
</tr>
<tr>
<td>Tourism/waste water and solid waste</td>
<td></td>
<td>PE WWS</td>
<td>water, air</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td></td>
<td>PE WWS, Daido, JBB, Private enterprise Hemosan</td>
<td>water, air, soil</td>
</tr>
</tbody>
</table>
ous period. Pollutant emissions, calculated in the 2013 NBB, both by using the "per capita" method emission factors, have proportionately increased during the comparative 2005-2015 period. There is an exception when it comes to the emission of TN and TP nutrients which is significantly lower. Emission of particular specific substances (heavy metals, toxic organic substances) encompasses all available data on emission of these substances in the following sectors: municipal waste water industry, fuel storage and distribution. Emission of the majority of specific toxins, both organic and inorganic, is generally lower. Their values vary during certain periods.

- Emissions from sectors of municipal waste water and tourism were estimated as before, in previous NBBs, by using emission factors found in literature, on "per-capita" basis, which results in certain inaccuracy compared to real emission, but comparability with previous data is good.

- For the purposes of calculating pollutant emissions in the 2013 NBB, data on production of municipal and hazardous solid waste were taken from the 2015-2020 National Waste Management Plan. However, the emission load calculating methodology and the
**Table 7: Matrix with ranking of impacts from LBS – land-based sources of pollution on the marine ecosystem**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Facility</th>
<th>Impact</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I FACILITIES/ SOURCES OF LBSP</strong></td>
<td></td>
<td>Spatial Rank*)</td>
<td></td>
</tr>
<tr>
<td><strong>MUNICIPAL WASTE WATERS</strong></td>
<td>Public Water Supply and Utility Companies and illegal outfalls</td>
<td>Regional-along the coast</td>
<td>No WWTP</td>
</tr>
<tr>
<td><strong>Municipal solid waste</strong></td>
<td>Landfills, facilities</td>
<td>local</td>
<td>One sanitary landfill</td>
</tr>
<tr>
<td><strong>HAZARDOUS WASTE</strong></td>
<td>Households</td>
<td>local</td>
<td>Estimation</td>
</tr>
<tr>
<td><em>(Liquid and solid)</em></td>
<td>Industry + ports</td>
<td>local</td>
<td>Collection and export</td>
</tr>
<tr>
<td><strong>TOURISM</strong></td>
<td>Municipal and hazardous waste</td>
<td>Regional-along the coast</td>
<td></td>
</tr>
<tr>
<td><strong>SHIP BUILDING</strong></td>
<td>Bijela Shipyard</td>
<td>local</td>
<td>Inadequate disposal</td>
</tr>
<tr>
<td><strong>PORT ACTIVITIES</strong></td>
<td>Port of Bar</td>
<td>local</td>
<td>Land-based sources</td>
</tr>
<tr>
<td></td>
<td>Adriatic marinas, Tivat</td>
<td>local</td>
<td>Land-based sources</td>
</tr>
<tr>
<td><strong>Industries and other activities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal</td>
<td>Daido, Kotor</td>
<td>local</td>
<td>Waste export</td>
</tr>
<tr>
<td>Food industry</td>
<td>Olive oil production</td>
<td>local</td>
<td>Water from technological process</td>
</tr>
<tr>
<td>Aleksandrija, Bijela</td>
<td>local</td>
<td></td>
<td>Public sewerage system</td>
</tr>
<tr>
<td>Pantomarket, Zelenika</td>
<td>local</td>
<td></td>
<td>Public sewerage system</td>
</tr>
<tr>
<td>Dairies, Ulcinj</td>
<td>local</td>
<td></td>
<td>Soil</td>
</tr>
</tbody>
</table>
### Sector

<table>
<thead>
<tr>
<th>Facility</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. FACILITIES/ SOURCES OF LBSP</strong></td>
<td><strong>II. ENVIRONMENT DESTRUCTION</strong></td>
</tr>
<tr>
<td><strong>MUNICIPAL WASTE WATERS</strong></td>
<td><strong>URBANISATION</strong></td>
</tr>
<tr>
<td>Public Water Supply and Utility Companies and illegal outfalls</td>
<td>Regional—along the coast Especially within 100 from coastal line</td>
</tr>
<tr>
<td><strong>HAZARDOUS WASTE</strong></td>
<td><strong>Private production</strong> regional Extensive</td>
</tr>
<tr>
<td>Household Local</td>
<td>Collection and export</td>
</tr>
<tr>
<td>Industry + ports Local</td>
<td></td>
</tr>
<tr>
<td><strong>TOURISM</strong></td>
<td><strong>Bijela Shipyard</strong> local Inadequate disposal</td>
</tr>
<tr>
<td>Municipal and hazardous waste Regional</td>
<td></td>
</tr>
<tr>
<td><strong>SHIP BUILDING</strong></td>
<td><strong>Port of Bar</strong> local Land-based sources</td>
</tr>
<tr>
<td><strong>Bijela Shipyard</strong> local Inadequate disposal</td>
<td></td>
</tr>
<tr>
<td><strong>PORT ACTIVITIES</strong></td>
<td><strong>Adriatic marinas, Tivat</strong> local Land-based sources</td>
</tr>
<tr>
<td><strong>Bijela Shipyard</strong> local Inadequate disposal</td>
<td></td>
</tr>
<tr>
<td><strong>Industries and other activities</strong></td>
<td><strong>Metal Daido, Kotor</strong> local Waste export</td>
</tr>
<tr>
<td><strong>Dairies, Ulcinj</strong> local Soil waste</td>
<td></td>
</tr>
<tr>
<td><strong>Road traffic</strong> Blue Line, H. Novi</td>
<td><strong>Air</strong></td>
</tr>
<tr>
<td><strong>Air traffic</strong> Tivat Airport</td>
<td>Air</td>
</tr>
<tr>
<td><strong>Fuel storage</strong> Jugopetrol, Kotor: Facilities in Port of Bar, Aircraft Maintenance Service and depots</td>
<td>Standardised emission calculation</td>
</tr>
<tr>
<td><strong>Private production</strong> regional Extensive</td>
<td></td>
</tr>
<tr>
<td><strong>AGRICULTURE</strong></td>
<td><strong>Regional</strong></td>
</tr>
<tr>
<td>*<em>Legend: Explanation <em>)</em></em></td>
<td></td>
</tr>
</tbody>
</table>

#### Impact rank

<table>
<thead>
<tr>
<th>Insignificant</th>
<th>Weak</th>
<th>Moderate</th>
<th>Strong</th>
<th>Very strong</th>
</tr>
</thead>
</table>

Data presenting structure are different from the one that was used in previous NBBs. Data include household waste, and waste from the industrial, commercial and tourism sectors. It is noticeable that these data are smaller, by more than an order of magnitude, than those calculated according to the 2004 Solid Waste Management Master Plan. Therefore, the data from the 2013 NBB are not comparable with those from previous NBBs.

Pressures generated by improper waste disposal have been significantly reduced in the 2005-2015 period, since the start of operation of the sanitary landfill Možura that currently accepts around 62,000 t of municipal waste from Bar, Ulcinj, Kotor, Budva, and Tivat on an annual basis. The municipality of Herceg Novi disposes of 14,500 t of municipal waste at the temporary disposal site Tisove grede (while construction of a sanitary landfill Duboki do is planned). Around 16,000 t of construction waste and 45,000 t of biodegradable waste are generated in the coastal zone annually. However, it is still nec-
necessary to improve the collection and disposal of waste and to finalize infrastructure for waste management.

- The 2013/2015 NBB contains data on the quantity of produced and collected hazardous waste, per materials, such as grit from ship blasting, oiled waste (oiled water, sludge, used oils), old car tires, batteries and car batteries, absorbents, electronic waste and medicines; some of them for the first time.

- Point sources of specific toxic substances significantly increase pollution (sensitivity) of the coastal zone and its surroundings, and they are deemed as hot spots. This is primarily related to the pollution caused by Bijela Shipyard, sediment-embedded pollution around former Arsenal in Tivat and, to a lesser degree, around Port of Bar. However, the quantity of produced grit in the 2013/2015 NBB is much lower than in the 2004 NBB, because the company former Arsenal from Tivat terminated its operations and Bijela Shipyard decreased its activities. As opposed to a short-term impact of municipal pollution, the long-term danger of this kind of pollution is its ability to accumulate in an ecosystem (biota-sediment).

- Emission of municipal waste water, due to its quantity and direct discharge into the sea, has the most significant impact on the pollution of the coastal waters. Efforts to improve waste water collection, treatment and discharge system are on-going. Moreover, a significant improvement has been achieved in the 2005-2015 period due to enhancement of sewage network (connections with main collectors and expansions). A treatment plant with the capacity of 110,000 PE (with two small plants in Jaz settlement) has been constructed in Budva. Other five municipalities do not have waste water treatment plants, but activities to develop design documentation for their construction are under way. The aim is to increase the level of connection of population to sewerage systems to 85% by 2020, and to build first phase treatment systems in all municipalities.

- Impact of the municipal waste water discharge is most obvious in the Boka Bay, due to high emission, a lot of discharge points, water dilution/desalination through numerous freshwater springs and limited water flow between the open sea and the Bay. Therefore the Bay is very susceptible to eutrophication, which was confirmed by vulnerability analysis conducted as a part of the Coastal Area Management Programme, Integrated Coastal Zone Management and other studies. The critical zones are Kotor Bay, Tivat Bay and Igalo Bay. Increased quantity of municipal waste water during tourist seasons increases susceptibility of the shallow water and open parts of the coast to eutrophication. This is mainly related to the part of Long Beach (Velika Plaza) around Port Milena canal and the estuary of the Bojana River, and in the zone of Bar and Budva Bay.

- The 2013/2015 NBB presented for the first time data on the measured emission load on the urban main waste water outfalls, with the exception of Budva. However, the measured values, even though presented, were not taken into account when calculating the emission load for two main reasons: (1) there were no data on the amount of waste water at all measurement locations, which
prevented us from calculating the total emission load; (2) measurements were made only twice a year, out of the tourist season (May and December 2010), so the calculation of the emission load for the entire year on the basis of these data would not be realistic.

The emission load from municipal water calculated using the "per capita" methodology deviates more or less from the real values obtained by real time measurements. This methodology allows the calculation of emission load only for five typical pollutants (TSS, BOD5, COD, TN and TP). Data obtained from measurements of load input/nutrient pollution through the main sewage outfalls in real time show significantly higher values than the ones calculated for DM, BOD5, TP and TN. COD values are an exception, as they are significantly lower than the measured ones, which is a consequence of the fact that the ratio of BOD/COD in waste water is different from the literature ratio of 1:2. This is expected due to the fact that emissions measurement in real time did not include a significant number of outfalls. In fact, significant quantities of municipal wastewater are discharged into the marine recipient through numerous individual outfalls (there are 87 registered ones in the Boka Bay only).

Real time measurements are lacking in order to calculate the pollutant emissions from industrial wastewater. They were made only in the company Daido metals.

Since nutrient loads from river discharges represent other important pollution sources in the coastal area of Montenegro, pollution load from the Bojana River, that is already high at the very source, is included in the 2013/2015 NBB. Due to a large amount of water (average flow of the Bojana River is about 640m³/s.) its quality parameters remain within the prescribed limits (class A2, C, II) till the lower part of its flow (at Fraskanjel station) where excess concentrations of some pollutants have been recorded. Slowed flow and closing up of the riverbed profile at the very mouth of the river (due to sediment deposits and relatively shallow depth) amplify pollution effects. Main source of nutrient loads are in the Bojana River highly impacted by the pollution from the Drin River when it flows into the Bojana River. The Bojana River is a transboundary flow, and the share of Montenegro in the total river flow is 3/5.

Data on emissions from the olive oil production sector were presented for the first time. Liquid emission load was calculated taking into account only the wastewater that is released from the olive fruit, because it was not possible to provide data on the consumed water in the fruit processing process. Given that the proportion of released water is considerably higher in the effluent quantity than that from the consumed water, data presented can be accepted with an acceptable deviation. Taking into account the contribution from the entire food industry sector, and from the industry as a whole, their impact on the marine ecosystem can be ignored, because of the emission size, mode and place of discharging or collecting and exporting hazardous waste.

Run-off factor was restated in the calculation of emission load from the fuel storage sector, in accordance with the official literature value, adopted by UNEP/MAP. Given the certain
oil purification and emission size, and the mode of effluent discharge and the distance from the sea (installations in the Port of Bar are the only ones directly next to the coast), the impact of this emission is not of greater interest.

- The problem of deposition of contaminants from the air is not adequately addressed in the 2013/2015 NBB as the approximation of the share of emissions in the coastal area of 2/7 of the total emissions at the national level is imprecise. Therefore, it should be ensured the development of models of deposition of toxicants from air based on realistically measured exhaust gas emissions and the number of motor vehicles in the coastal zone.

- The new 2013/2015 NBB provides more precise and more complete data on generated and collected, liquid and solid hazardous waste (oiled waste, car batteries, car tyres, electronic waste, and medicines).

- Data from the Pollution Inventory related to the very small sources of pollution and oiled material were not used for calculation of pollutant emissions in the new 2013/2015 NBB. Nevertheless, these are registered in the list of the private enterprise Hemosan. These types of waste are exported for further processing and have no significant impact on the marine ecosystem.

- Comparability of other emission data, shown in the 2003-2013/2015 NBB documents is relative, due to lack of data on real emissions, insufficient data on land-based sources and their emission during the relevant period and changes in business activities of some business entities. In order to improve data on pollutants emission, it is necessary to establish a valid emissions inventory.

The afore-mentioned data on the emission of polluting substances from land-based sources are in correlation to the vulnerability assessment of the narrow strip of marine ecosystem developed in the framework of the Coastal Area Management Programme of Montenegro (CAMP MNE). Namely, the vulnerability assessment singled out the following areas as exceptionally vulnerable: narrow part of the Boka Bay, part between Bijela Shipyard and Porto Montenegro port, the Bay of Igalo and the narrow shallow belt from Valdanos to the Bojana River mouth. The narrow coastal belt of the open sea and the Boka Bay are also very vulnerable to pollution from possible accidents at sea. There is a high degree of vulnerability of the Boka Bay and the Bay of Tivat, ports in Budva and Bar, and stretches from Ulcinj to Port Milena. Water and sediment pollution are particularly emphasized in the immediate vicinity of Bijela Shipyard and within a short reach from the site of former ship overhaul institute Arsenal, where high concentrations of heavy metals and organic pollutants have been registered. The level of pollution at the open sea is lower due to relatively great depth and good mixing of waters.

5.2 Update of the hotspots and their classification based on the new evaluation criteria

There are many sources of pollution on the terrestrial part of the coastal area which generated pollution at hot spots such as: previous "historical" industrial pollution, ports, shipyards, untreated waste water, sewage outfalls from smaller industrial plants of different types, unregulated waste dis-
posal sites and dumpsites, use of mineral resources, etc., which are identified in 2013/2015 NBB. The cumulative effects of a large number of pollutants in a small space are particularly concerning.

Identification of hot spots and sensitive areas in the 2005 NAP was based on previously gathered data which were the only available ones, and on empirical evaluation, which resulted in a lack of definition of hot spots following the methodology that was applied in the Mediterranean region. In other words, the 2005 Transboundary Diagnostic Analysis - TDA, which was prepared by UNEP/MAP for the needs of SAP/MED development, did not cover the coastal area of Montenegro.

The hot spots used to examine the quality of sea water, sediment and selected suitable bio-indicators were identified using the empirical estimates and data available from individual projects and from the Monitoring Programme of the State of Marine Ecosystem whose implementation started with reference to MEDPOL implementation in Montenegro back in 2007. Monitoring which was conducted in the afore-mentioned manner is presented in Table 8.

This programme, which was implemented in the 2008-2012 period, included the following hot spots: Bijela Shipyard, Overhaul Institute in Tivat, Bar Bay and Ada Bojana (mouth of the River Bojana), and the "trend" locations included were the sea waters of Kotor, Tivat, Risan, Herceg Novi, Budva, Bar and Port Milena, by following the same parameters and with the same sampling frequency. Due to budget constraints, in 2012 this part of the Monitoring Programme of the State of Marine Ecosystem was reduced and implemented only at the location of Porto Montenegro, and in 2013 the monitoring programme was completely non-existent, while in the past two years it was implemented from August 2014 to June 2015 only at locations in the Boka Bay. Based on the available data on the quality of sea water, sediments and biota in studied locations, the quality of sea water was characterized as follows:

- the waters of Risan and Tivat Bay periodical-ly go into the A3 class in terms of nutrient contents and the waters of Tivat Bay are outside class in terms of contents of toxicants Hg, PAH, mineral oils, As, Cd, TBT;
- the waters of Kotor Bay go out of A3 class by parameters of: PAH, Hg and mineral oils, TBT;
- the waters of Herceg Novi Bay are in the A3 class by parameters of: Hg, As, Cu, deter-gents, NO3 and PAH, TBT;
- water quality in ports of Bar, Budva, Tivat, Kotor and Port Milena is outside class;
- water is polluted particularly high in the immediate vicinity of the Bijela Shipyard and narrow location of the former Overhaul Institute Arsenal, which are contaminated with heavy metals and organic pollution.

Analysis of the pollution impact in these locations was also carried out in the framework of the Coastal Area Management Programme - CAMP MNE, and the results are shown in Figure 1.

Sediment quality extremely affects the quality of sea water, as well as bioaccumulation of hazardous substances from the sediment in shells and other organisms. Also, sediment migrates owing to undulation, sea currents (about 3.5 m/s), and the passage of ships, so that contamination can be spread relatively easily. The possibility which requires
special attention is that of bioaccumulation of pollutants in shells on farms near the hot spots in Bijela Shipyard, former Arsenal's site in Tivat and Dobrota, near the Institute of Marine Biology in the Kotor Bay.

Table 8: Monitoring programme of hotspots, pollution trend and biomonitoring for 2011

<table>
<thead>
<tr>
<th>STATION LOCATION</th>
<th>STATION TYPE</th>
<th>MATRIX</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bijela Shipyard</td>
<td>Hot spot</td>
<td>Water, sediment bioindicators</td>
<td>Persistent and bioaccumulative organic and inorganic toxicants:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TM (Cd, Hg, Cu, Ni, Pb, Zn, Cr, As, Sn - TBT and TMT),</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>POPs (aldrin, dieldrin, endrin, DDT, DDE, heptachlor, PCBs, toxafen, mirex,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luštica Dobra Luka</td>
<td>Reference</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Bar bay</td>
<td>Hot spot</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Ada Bojana</td>
<td>Transition - sensitive area</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Location near the former Overhaul Institute in Tivat</td>
<td>Hot spot</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Port of Bar</td>
<td>Hot spot Enclosed waters</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Port of Budva</td>
<td>Sensitive area</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Port of Herceg Novi</td>
<td>Sensitive area</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Port of Tivat</td>
<td>Enclosed waters</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Port of Risan</td>
<td>Sensitive area</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
<tr>
<td>Port of Kotor</td>
<td>Enclosed waters</td>
<td>Water, sediment bioindicators</td>
<td></td>
</tr>
</tbody>
</table>

The results of the sediment analysis presented in Table 9 show that the waters of Boka Bay in the vicinity of Bijela Shipyard, the former Overhaul Institute – Arsenal in Tivat and the location in Dobrota next to the Institute for Marine Biology are contaminated with high concentrations of heavy metals that exceed CEFAS Action Level 2 which requires the dredging of sediments or their removal from the marine ecosystem. Such a high pollution is a consequence of the impact of large amounts of used grit from ship blasting which has been ending up in the sea for years. Table 9 provides an overview of
the sediment pollution state at hot spots and trend locations. As Montenegro did not adopt standards governing the quality of sediment, international regulations that define the impact of sediment on human health and ecosystem were applied to assess the quality of sediment, as follows: Marine Water Quality and sediment VOL 3: CEFAS: Centre for Environment, Fisheries and Aquaculture Science*, and MPC - Maximum Permissible Concentration - Sediment quality objective in the Netherlands.**

Samples of shells taken from the wharf of Bijela Shipyard in 2002, 2007, 2008 and 2009 contained high concentrations of Pb, Cd, Hg, Ni, PCBs, PAHs, and Zn compared to the norms prescribed by national and EU legislation (EU norms were applied given that the national legislation did not include all the toxicants in shells). This is an expected consequence of sediment and water contamination. The situation is similar in terms of contamination of shells in the vicinity of the former Arsenal, in the ports of Bar and Budva. The samples of shells from Ada Bojana analysed in 2010 contained a high content of Pb, As, Ni, Zn, and PCBs, while the samples analysed in 2008 and 2009 contained high concentrations of Hg, PAHs and organochlorine pesticides (OCP), which is probably a consequence of transport of pollution from the Gulf of Durres in Albania and entry of pollution via the Bojana River (since organochlorine pesticides are not used in Montenegro).

5.2.1 2015 NAP's hot spot assessment

NAP Update Guidelines [UNEP(DEPI)/MED WG.393/10] establishes criteria for the assessment of hot spots and sensitive areas. Updating the criteria for assessment of national hot spots and sensitive areas was carried out in the context of fulfilling the SAP/MED and Regional Plans legally binding requirements and EcAp implementation. The criteria defined in such a manner gave priority to the impact on human health, so the definition of hot spots according to which they constitute "point sources of pollution along Mediterranean shores which significantly affect human health, ecosystems, biodiversity, or sustainability of the economy" has been accepted. These are the main points on which high levels of pollution originating from households or industry are discharged. The use of assessment criteria requires the following two steps to be taken:

- screening of potential hot spots and sensitive areas,
- assessment of potential hot spots and sensitive areas by applying the updated criteria.

![Figure 1. Pollution of the sea and sediments at hot spots - CAMP Montenegro](image)
**Table 9: Overview of sediment pollution at hot spots and trend locations in 2011**

<table>
<thead>
<tr>
<th>Location</th>
<th>Sediment pollution above the MAQs for soil and CEFAS* and MPC Netherlands (EU) norms**;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bijela Shipyard</strong></td>
<td>Hg, Cu, Ni, Pb, Zn, Cd, Cr, As, Sn, Se, MBT, DBT, TBT, PAHs, PCBs, ppDDE. The degree of contamination with Pb, Zn, Hg, Cu, Cr, Ni, PAHs, TBT, PCBs and PAHs <strong>exceeds the maximum permissible concentration</strong> according to CEFAS* and MPC Netherlands (EU)**</td>
</tr>
<tr>
<td><strong>Overhaul Institute Arsenal (current Porto Montenegro)</strong></td>
<td>Hg, Cu, Ni, Pb, Zn, Ni, Cr, As, MBT, DBT, TBT, PCBs, ppDDE, DDD, PCBs and PAHs. The degree of contamination with Pb, Zn, Hg, and PAHs exceeds the maximum permissible concentration according to CEFAS* and MPC Netherlands (EU)**</td>
</tr>
<tr>
<td><strong>Kotor Bay next to the Institute of Marine Biology (IMB)</strong></td>
<td>Hg, Cu, Ni, Zn, Ni, Cd, PCBs, ppDDE, MBT, TBT, PCBs, PAH. The degree of contamination with Hg, Zn, PAHs and Cr <strong>exceeds the maximum permissible concentration</strong> according to CEFAS* and MPC Netherlands (EU)**</td>
</tr>
<tr>
<td><strong>Port of Kotor</strong></td>
<td>Cd, Hg, Cu, Ni, Cd, Pb, Cr, PCBs, TBT and PAHs. The degree of contamination with Hg, Zn, PAHs and Cr <strong>exceeds the maximum permissible concentration</strong> according to CEFAS* and MPC Netherlands (EU)**</td>
</tr>
<tr>
<td><strong>Port of Tivat</strong></td>
<td>Hg, Cu, Ni, TBT, PCBs, PAHs, given that the degree of contamination exceeds the maximum permissible concentration according to CEFAS* and MPC Netherlands (EU)**, and from the point of view of pollution with DDD, DBT and Cr the degree of contamination <strong>exceeds target values</strong>;</td>
</tr>
<tr>
<td><strong>Port of Budva</strong></td>
<td>Zn, Ni, Cr, DBT, TBT, PCBs, and pp-DDE, and the contents of Cu, Cr, TBT and PAHs is **above the MPC Netherlands(EU)****,</td>
</tr>
<tr>
<td><strong>Bar Bay</strong></td>
<td>Hg, Ni, Cr, and the pollution with: Cu, Pb, Cd, Zn, PAHs, PCBs <strong>exceeds the maximum permissible concentration</strong> according to CEFAS* and MPC Netherlands(EU)**</td>
</tr>
<tr>
<td><strong>Port of Risan</strong></td>
<td>Zn, PAHs, PCBs, DDE increased concentrations above the target values.</td>
</tr>
<tr>
<td><strong>Port Milena</strong></td>
<td>The mud from the canal belongs to C category under the Law on Waste Management (Official Gazette of Montenegro 64/11) and the water from the canal is <strong>outside the categories</strong> according to the parameters Bof OD5, COD, NO3, NO3, PO4 and contents of Ni, and Cr.</td>
</tr>
</tbody>
</table>

*Marine Water Quality and sediment VOL 3: CEFAS: Centre for Environment, Fisheries and Aquaculture Science*, **MPC - Maximum Permissible Concentration - Sediment quality objective in the Netherlands**
Four categories of criteria for screening the locations of potential hot spots were determined: A - priority hot spot; B - hot spot; C - potential hot spot/sensitive area and D - no hot spot.

The aforementioned groups include the criteria shown in Table 10.

Severity factors – multipliers (Table 11) were defined for the said criteria to enable as objective a determination and mutual separation of the importance and size of individual assessed impacts as possible.

Depending on the value which is calculated for each individual hot spot, they are classified into 4 categories A, B, C or D (Table 12.)

Applying the above criteria for scoring potential hotspots in the Boka Bay: Port of Kotor, Port of Herceg Novi, Kotor Bay near the Institute of Marine Biology - IMB, Port of Tivat, Port of Risan, Bijela Shipyard and the site of the former Overhaul Institute Arsenal in Tivat, now Porto Montenegro, as well as on the shorelines of the coastal region: Port of Bar, Port Milena and Port of Budva, generated the results which were presented in detail in Annex VIII, while a summary of the scoring values are shown in Tables 13, 14 and 15 below. Priority hot spot – (A) is the Port Milena canal because of the high concentrations of organic contaminants via input of sewage and the impact of waste water and microbiological contamination of the marine biota on the health of the surrounding population and the tourism use of this attractive area. Six locations qualified as hotspots category (B) and 4 locations were classified as sensitive areas. For locations with high pollution levels of sea water, soil and sediments with priority pollutants, such as the location of the shipyard in Bijela the score value is significantly reduced by a small number of inhabitants, low influence of municipal waste water, and the inadequacy of applying the criteria of quality of drinking water and bathing water and tourist valorisation. In explanation, these are locations with industrial contamination and with a pronounced negative impact on the marine ecosystem in which rehabilitation is a priority.

5.3 Identification of laws and regulations governing the discharge of key pollutants and regulating economic and human activities to prevent/control the discharge of pollutants

With regard to the findings above listed in 5.1 (fulfilment of the technical requirements of SAP/MED and Regional Plans), it is important to list the most important findings of present status in meeting EO5 and EO10 legal and institutional requirements. The relevant national legal acts are the following ones:

- Law on Waters (Official Gazette of Montenegro 27/07, Official Gazette of Montenegro 48/15)
- Law on Waste Management (Official Gazette of MNE no. 64/11)
- Decree on classification and categorization of surface and ground waters (Official Gazette of Montenegro 02/07)
- Rulebook on the quality and sanitary-technical conditions for waste water discharge into the recipient and public sewage system, method and procedure of testing waste wa-
Table 10: Hot spot categorisation criteria

<table>
<thead>
<tr>
<th>Category</th>
<th>Multiplier</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Population</td>
<td>4</td>
<td>1-4</td>
</tr>
<tr>
<td>2) Wastewater treatment</td>
<td>4</td>
<td>1-4</td>
</tr>
<tr>
<td>3) Drinking water quality</td>
<td>4</td>
<td>1-4</td>
</tr>
<tr>
<td>4) Bathing water quality</td>
<td>4</td>
<td>1-4</td>
</tr>
<tr>
<td><strong>SCORE</strong></td>
<td><strong>16-64</strong></td>
<td></td>
</tr>
<tr>
<td>Environmental Status and Pressures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Organic matter</td>
<td>3</td>
<td>1-4</td>
</tr>
<tr>
<td>6) Nutrients and biological status</td>
<td>3</td>
<td>1-4</td>
</tr>
<tr>
<td>7) Contaminants</td>
<td>3</td>
<td>1-4</td>
</tr>
<tr>
<td>8) Marine litter</td>
<td>3</td>
<td>1-4</td>
</tr>
<tr>
<td><strong>SCORE</strong></td>
<td><strong>12-48</strong></td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) Economic activities and ecosystem services underpinning them</td>
<td>4</td>
<td>1-4</td>
</tr>
<tr>
<td><strong>SCORE</strong></td>
<td><strong>4-16</strong></td>
<td></td>
</tr>
<tr>
<td>10) Transboundary effects</td>
<td>1</td>
<td>1-4</td>
</tr>
<tr>
<td><strong>SCORE</strong></td>
<td><strong>1-4</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 12: Assessment criteria for hot spots and sensitive areas

<table>
<thead>
<tr>
<th>Category</th>
<th>Total number of points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority hot spot (A)</td>
<td>132 – 107</td>
</tr>
<tr>
<td>Hot spot (B)</td>
<td>106 – 82</td>
</tr>
<tr>
<td>Potential hot spot / Sensitive area (C)</td>
<td>81 – 58</td>
</tr>
<tr>
<td>No hotspot (D)</td>
<td>57 – 33</td>
</tr>
</tbody>
</table>

ter quality, minimum number of tests and the contents of the report on the determined waste water quality (Official Gazette of Montenegro 45/08 and 9/10, 26/12 and 56/12)
- Decree on the National list of environmental indicators (Official Gazette of Montenegro 19/13)
- Law on the Ratification of the Barcelona Convention and Five Protocols (Official Gazette of Montenegro 64/07)
- Other bylaws reached based on the Law on Waters and related to water management.

Comparing national legislation provisions with relevant SAP/MED and Regional Plans requirements a number of findings may be given:

- Law on Waste Management (Official Gazette of MNE 64/11) creates the basis for the establishment of an adequate system of waste collection, including prevention of creation, reuse, recycling and ecological disposal, i.e. environmentally sound disposal. Articles 13 and 14 regulate separated collection of waste packaging from other type of waste and enable at minimum 50% of the total quantity of collected waste to be prepared for reuse or recycling.
- Article 98 of the Law on Waste Management (Official Gazette of MNE 64/11) stipulates that the responsible local self-government authority is obliged to make an inventory of undeveloped dumps in the its territory, make a remediation plan for these dumps and incorporate them into the local plan referred to in Article 94, para. 3 of this Law, within one year from the date of coming into effect of this Law.
- With regard to application of cost effective measures as to prevent any marine littering from dredging activities it is important that the Law on SEA and Low on EIA stipulate that SEA and EIA are mandatory, and this instruments require application of CBA and CEA and CE assessments. In case of possible dredging of polluted sediment in the Bijela Shipyard and in the Porto Montenegro marina, it is necessary to take all preventive actions to prevent dispersed pollution during dredging activities.
- The Decree on classification and categorization of surface and ground waters (Official Gazette of Montenegro 02/07) proscribes the limits for nutrients in surface and ground waters, including the coastal waters (data
### Table 13: Ranking of hot spots and sensitive areas

**The Boka Bay 1**

<table>
<thead>
<tr>
<th>Categorization of Hot Spots</th>
<th>Shipyard Bijela</th>
<th>Location RMZ, Tivat-Porto Montenegro</th>
<th>Port of Tivat</th>
<th>Port of Risan</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Drinking water quality</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Bathing water quality</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Good environmental status and pressures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic matter</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Nutrients and biological status</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Contaminants</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Marine litter</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic activities and ecosystem services underpinning them</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Transboundary effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transboundary effects</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td><strong>104</strong></td>
<td><strong>71</strong></td>
<td><strong>79</strong></td>
<td><strong>65</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hot spot category</strong></td>
<td><strong>Hot spot (B)</strong></td>
<td><strong>Sensitive area (C)</strong></td>
<td><strong>Sensitive area (C)</strong></td>
<td><strong>Sensitive area (C)</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 14: Ranking of hot spots and sensitive areas  
*The Boka Bay 2*

<table>
<thead>
<tr>
<th>Categorization of Hot Spots</th>
<th>Port of Kotor</th>
<th>Port of Herceg Novi</th>
<th>Kotor IBM</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Drinking water quality</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Bathing water quality</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Good environmental status and pressures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic matter</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Nutrients and biological status</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Contaminants</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Marine litter</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic activities and ecosystem services underpinning them</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Transboundary effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transboundary effects</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td><strong>101</strong></td>
<td><strong>79</strong></td>
<td><strong>104</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hot spot category</th>
<th>Hot spot (B)</th>
<th>Sensitive area (B)</th>
<th>Hot spot (B)</th>
</tr>
</thead>
</table>
Table 15: Ranking of hot spots and sensitive areas - coastal area

<table>
<thead>
<tr>
<th>Categorization of Hot Spots</th>
<th>Port of Budva</th>
<th>Port of Bar</th>
<th>Ada Bojana</th>
<th>Port Milena</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Drinking water quality</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Bathing water quality</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Good environmental status and pressures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic matter</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Nutrients and biological status</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Contaminants</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Marine litter</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic activities and ecosystem services underpinning them</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Transboundary effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transboundary effects</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td>64</td>
<td>84</td>
<td>97</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>Hot spot category</td>
<td>Sensitive area (C)</td>
<td>Hot spot (B)</td>
<td>Hot spot (B)</td>
<td>Priority Hot spot (A)</td>
<td></td>
</tr>
</tbody>
</table>
presented in Fact Sheet A). The maximally permitted concentrations (MPCs) that are prescribed for nutrient concentrations by this Decree ensure levels that will not lead to eutrophication in the defined open sea classes and in Boka Bay, except in hot-spot locations and port basins where eutrophication values go over MPCs. Once EcAp indicators are introduced the compliance of MPCs for key nutrients in the marine environment may be assessed with regards to levels which are not conductive to eutrophication according to EcAp/IMAP.

The amendments to the Rulebook on the quality and sanitary-technical conditions for waste water discharge into the recipient and public sewage system, method and procedure of testing waste water quality, minimum number of tests and the contents of the report on the determined waste water quality (Official Gazette of Montenegro 26/12) defines in Article 5 the ELVs\(^5\) for concentration of hazardous and noxious substances in wastewater discharged in surface water: BOD < 25mg/l, COD < 125 mg/l, and TOC < 15mg/l.

The Rulebook does not define the individual ELVs\(^6\) for NO\(_2\), NO\(_3\), NH\(_4\), and PO\(_4\) in wastewater discharged into ground water of categories I, II and III, as it was defined by the previous Rulebook (Official Gazette of Montenegro 45/08).

This Rulebook does not particularly define conditions for the food industry, but the norms which are defined are somewhat stricter than the requirements in the Regional plan to reduce BOD from the food sector (Decision IG 20/8.2) and from municipal wastewater (Decision IG 19/7).

- For monitoring of discharges from municipal wastewater treatment plants Rulebook prescribes the norms for ELVs\(^7\) that are applicable to treated water in the wastewater treatment plant in Budva which started to operate in late 2014. Wastewater quality measurement in Budva, implemented through the monitoring of the sea ecosystem in 2010, before the wastewater treatment plant started to work, showed that BOD5 was in the range of 323-389 mg O2/l. Measurements made after the plant started to operate demonstrate a drastic decrease in BOD5 concentration (0.7-2.27mgO2/l) which shows high efficiency of the new facility. The efficiency of this device is obvious, as there are the positive effects on the marine ecosystem.

- The first results of the monitoring of treated wastewater before discharge in the sea in October and December 2014 were the following: BOD5 from 0.7-2.27mgO2/l, COD from 9.0-13.52mgO2/l, TP from 0.02-0.96 mg P/l, TN < 3.0mgN/l. These results demonstrate that the quality of treated water mostly corresponds to the A1-A2 class of water quality according to the Decree on classification and categorisation of surface and ground waters. According to the results of the analysis, the sample of processed sewage sludge from the water treatment plant in Bečići (with the capacity of less than 100,000 PE), it can be concluded that the quality of mud corresponds

\(^5\) Emission limit values ELVs = Granične vrijednosti emisija – GVE (MNE)

\(^6\) Emission limit values ELVs = Granične vrijednosti emisija – GVE (MNE)

\(^7\) Emission limit values ELVs = Granične vrijednosti emisija – GVE (MNE)
to the conditions proscribed by the Rulebook on more detailed requirements to be met by municipal sewage sludge, quantities, volume, frequency and methods of analysing municipal sewage sludge for permitted purposes and requirements to be met by land planned for its use (Official Gazette of Montenegro 89/09) and the water belongs to quality group A. Therefore it may be concluded that effluent complies with the Regional Plan ELV.

- Monitoring of nutrient over-enrichment has certain lacks since national legislation does not include provisions for the reduction and thresholds for nutrient inputs into sensitive areas and bathing sites. The Decree on classification and categorization of surface and ground waters (Official Gazette of RMN 02/07) does not stipulate necessary norms and standards for the reduction of pollution input and the control of marine environment. In the context of transposition of MSFD into the national legislative framework and the implementation of EcAp approach, a new regulation is necessary to be adopted by 2019, which will regulate these issues.

- Montenegrin legislation does not recognize the problem of marine litter. It is necessary to define measures to prevent its entry into the river flows or into the sea.

With regard to the findings above listed in 5.1 (fulfilment of the technical requirements of SAP/MED and Regional Plans), it is important to list the most important findings of present status in meeting EO9 legal and institutional requirements. The relevant national legal acts which were adopted prior to 2015 are the following:

- Application of BAT and BEPs is explicitly defined in the Law on Integrated Pollution Prevention and Control (Official Gazette of MNE 50/08, 54/09; 40/11 and 3/14) but does not specify use in the management of PCBs.

- The Law on Chemicals (Official Gazette of MNE 18/12) stipulates in Article 34 prohibition of use of chemicals listed in the Rulebook on prohibition and limited use, sale and production of chemicals representing an unacceptable risk for human health and environment (Official Gazette of MNE no. 10-105/161/2013), and that in chemicals management it is obligatory to apply BLP (best laboratory practice).

- The Environmental Protection Agency, as the competent authority, has issued only 3 IPPC permits so far: Deponija Ltd. from Podgorica, Možura Ltd. from Bar and Pro gas from Podgorica.

- The Rulebook on prohibition and limited use, sale and production of chemicals representing an unacceptable risk for human health and environment (Official Gazette of MNE 10-105/161/2013) prohibited the use of 9 pesticides (Aldrin, dieldrin, endrin, DDT, DDE, Heptachlor, HCB, Toxafen, Mirex), as well as PCBs (except in the facilities that are still in use maximum until 31 December 2020 in accordance with Article 93 of the Law on Waste Management) and Lindan-gama HCH, as well as reduction of emission of unintentionally produced HCB, PeCB and PCDDs and PCDFs. Use of POPs is prohibited in Montenegro already 20 years ago except for the use of Lindane (gamma HCH) and endosulfan, the use of which is now prohibited, but they are anyhow not sold in Montenegro for over 6 years.
- There is a plan to amend legal regulations on unintentionally produced POPs by 2016 and the Environmental Protection Agency is supposed to make an inventory of emissions and engage in their monitoring by 2018. There are also plans regarding education about reduction of emissions from furnaces.
- Strict implementation of the adopted legal regulations should provide for minimization of effect of contamination of marine environment and fulfilment of preconditions for good quality of the marine ecosystem (GES) (prescribed in the Decrees and Rulebooks listed in Annex 1 enclosed with the documentation).

In order to prevent acute pollution events and minimization of their impacts, it is important to enable enforcement of the following legal acts:

- Law on Ports (Official Gazette of MNE 51/08)

With regard to phasing out discharges, emissions and losses of organomercuric compounds and reduce those of organolead and organotin compounds, it is important to take note that existing regulations do not define organometal compounds of Pb, Hg and Sn. They define the total content of heavy metals Hg, Pb in sea water, as well as the concentration of Hg, Pb and Sn in waste water. For the biological material – shellfishes it is only the content of Hg, Pb, Cd, PCBs, dioxin and furan that are regulated, and the other pollutants are not. In the assessment of pollution of the sea, sediments and biota standards were used that are prescribed by EU legislation (standards of the Netherlands, Great Britain and CEFAS, as well as Canadian standards).

With regard to the requirements on phasing out PAHs, it is important to record that concentration of PAH in the sea water, waste water, land and fuel are regulated on the basis of the following legal acts:

- Decree on classification and categorization of the surface and ground waters (Official Gazette of the Republic of Montenegro 02/07)
- Decree on the establishment of the types of polluting matters, limit values and other standards of air quality (Official Gazette of Montenegro 45/08, Official Gazette of Montenegro 25/2012)
- Decree on the limit values for emissions of air pollutants from stationary sources (Official Gazette of Montenegro 10/2011)
- Decree on the limit values for the contents of the polluting matters in the liquid fuels of oil origin (Official Gazette of Montenegro 39/2010 and 43/2010)
- Decree on the permissible emissions into the air from stationary sources (Official Gazette of Montenegro 10/11)
- Decree on the maximum national emissions of certain pollutants (Official Gazette of Montenegro 3/12)
- Rulebook on the quality and sanitary-technical conditions for waste water discharge into the recipient and public sewage system, method and procedure of testing waste water quality, minimum number of tests and the contents of the report on the determined
waste water quality (Official Gazette of Montenegro 45/08 and 9/10, 26/12 and 56/12)
- Rulebook on the permitted quantities of hazardous and noxious substances in soil and methods for its testing (Official Gazette of Montenegro 18/97)
- Rulebook on technical and other requirements for devices and equipment for engines of the vehicles using liquid oil or natural gas (Official Gazette of Montenegro 23/13).

The content and release of mercury into waters, soil and air has been monitored in Montenegro since passing of the following regulations which include standards for mercury as well:

- Decree on classification and categorization of surface and ground waters (Official Gazette of the Republic of Montenegro 02/07)
- Decree laying down types of pollutants, limit values and other air quality standards (Official Gazette of Montenegro 45/08)
- Rulebook on the quality and sanitary-technical conditions for waste water discharge into the recipient and public sewage system, method and procedure of testing waste water quality, minimum number of tests and the contents of the report on the determined waste water quality (Official Gazette of Montenegro 45/08 and 9/10, 26/12, 56/12, 26/12, of 24 May 2012)
- Rulebook on the permitted quantities of hazardous and noxious substances in soil and methods for its testing (Official Gazette of the Republic of Montenegro 18/97).

With regard to elimination of radioactive substances the provisions of the Law on Protection from Ionizing Radiation and Radiation Safety (Official Gazette of Montenegro 56/09, 58/09, 40/11 35/13) with the related rulebooks are relevant.

Disposal of hazardous wastes in a safe and environmentally sound manner is regulated by following legal acts:

- Waste Management Law (Official Gazette of Montenegro 64/11); the procedure for amending the Waste Management Law is in progress;
- Rulebook on more detailed conditions for storage, measures for safe keeping or use of hazardous chemicals (Official Gazette of Montenegro 10-105/108)
- Rulebook on the treatment of equipment and waste containing PCBs (Official Gazette of Montenegro 48/12), etc.
- Disposal and import of hazardous waste is prohibited in Montenegro; export of hazardous waste is regulated in line with the Basel Convention and the above rulebooks.

The quality of bathing waters is regulated by:

- Law on Waters (Official Gazette of the Republic of Montenegro 27/07 and Official Gazette of Montenegro 32/11, 48/15)
- Art. 12-17 of the Decree on classification and categorization of surface and ground waters (Official Gazette of Montenegro 02/07)
- Rulebook on conditions that must be met by developed and built bathing places (Official Gazette of Montenegro 20/08, 20/09, 25/09, 4/10, 61/10, 26/11)
- The Programme of systematic testing of quantity and quality of surface and ground water for 2013.
Out of the above listed relevant legal acts and their requirements, comparing national legislation provisions with relevant SAP/MED and Regional Plans requirements the following relevant findings may be given:

- With regard to the requirement to adopt national ELVs for mercury emissions based on values included in the “regional plan on the reduction of inputs of mercury” from other than chlor alkali industry, it is important to note that article 5 of the Rulebook on the quality and sanitary-technical conditions for waste water discharge into the recipient and public sewage system, method and procedure of testing waste water quality, minimum number of tests and the contents of the report on the determined waste water quality (Official Gazette of Montenegro 26/12, of 24 May 2012) stipulates maximal emitted values ELVs\(^8\) of mercury in waste waters that are discharged into surface waters and it equals 0,005 mg/l, or 5 µg/l. Concentration of Hg in waste waters exceeding such established ELV has not been detected since 2012. The requirement relating to setting of mercury ELV (emission limit value) has been met in Montenegro since May 2012 when the above mentioned Regulation stipulated ELV of 5 µg/l.

- Montenegro does not have installations using mercury as a catalyst and, therefore, there is no emission of mercury from chlorine production plants. Consequently, the existing regulation does not regulate the prohibition of construction of new plants for production of vinyl chloride monomer or plants for chlorine production. The use of mercury in existing circumstances is regulated by the Rulebook on prohibitions and restrictions on use, marketing and manufacturing of chemicals that pose an unacceptable risk to human health and the environment (Official Gazette of Montenegro 10-105/161, October 2013). This regulation governs restrictions on the use of mercury.

- With regard to prohibition and/or take legal and administrative measures necessary to eliminate the production and use, import and export of POPs and their wastes, article 34 of the Law on Chemicals (Official Gazette of Montenegro 18/12) stipulates prohibition of trade in and use of chemicals which are defined by the Rulebook on prohibitions and restrictions on use, marketing and manufacturing of chemicals that pose an unacceptable risk to human health and the environment (Official Gazette of Montenegro 10-105/161/13). Annex 2 to this Rulebook establishes a list of prohibited POPs in accordance with requirements of the Stockholm Convention, and "new POPs".

- Eight pieces of secondary legislation have been passed under the Law on Chemicals and they can also be considered relevant for matters of prohibition and elimination of POPs.

- Law on Waste Management (Official Gazette 64/11) prescribes the obligation according to which PCBs must be eliminated from the equipment that is not in operation no later than 31 December 2015 and which is in operation until 2020. Import of PCBs and equipment with PCBs was banned since 2000.
The Decree on the limit values for emissions of air pollutants from stationary sources (Official Gazette of Montenegro 10/2011) establishes a general value of emissions of polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (dioxins and furans-PCDF) into the air, which equals 0.25 µg/m³ for mass flow rate and 0.1µg/m³ for mass concentration, whereby the mass of dioxins and furans is expressed by the product of multiplication of mass and factor of toxicity equivalence.

There is inconsistency of national assessment of the quality of water in bathing areas and the Programme of systematic testing of quantity and quality of surface and ground water for 2013 with the Decision of signatories to the Barcelona Convention IG 20/9; national system defines 3: C1, C2 and "outside class", and the Decision IG 20/9 defines 4 classes: A, B, C, D (A-excellent <100cfu/100ml; B-good 101-200 cfu/ 100ml, C-sufficient 185 cfu (for 95%)}, D > 185 cfu-Poor (90 %). The norm for maximum permitted concentrations of enterococci is in line with the Decision IG 20/9.

5.4 Identification of existing governmental institutional structures controlling and monitoring the discharge of key pollutants from land-based sources of pollution

The institutional organization which has been set up to enable enforcement of laws and regulations on pollution prevention and control and to regulate economic and human activities that generate pressures to the marine environment is pretty complex. A comprehensive analysis of the weaknesses and needs of the institutional framework of relevance for integrated coastal zone management was prepared for the needs of developing the National Strategy for Coastal Zone Management of Montenegro. Measures and actions have been defined on that basis, including those of relevance for control and monitoring of pollution from land-based sources. The NS ICZM provided for the strategic goals for establishment of coastal processes monitoring and for building infrastructure to reduce and/or prevent pollution from land-based sources. A number of measures of relevance for ensuring data availability, establishing programmes for marine environment monitoring, building institutional capacities, but also for building infrastructure to reduce and prevent pollution, have been formulated.

With a view to building institutional capacities, the NS ICZM proposed to expand the current composition of the National Sustainable Development and Climate Change Council by involving representatives of key decision makers from ministries, administrative bodies and institutions relevant for ICZM, and local self-governments in the coastal area. The new National Council on Sustainable Development, Climate Change and Integrated Coastal Zone Management was established by a Government's decision adopted in July 2015.

The Rulebook on the organization of the Ministry for Sustainable Development and Tourism provided for the establishment of an organizational unit in charge of integrated coastal zone management. That unit was established by expanding the responsibilities of the existing Department for Sustainable Development which functioned as a part of Minister’s Office. Since the NS ICZM defines the policy
for sustainable management of the coastal area, it was decided to combine the two sets of responsibilities under the Department for Sustainable Development and Integrated Coastal Zone Management. This Department is responsible for coordination of NS ICZM’s implementation, including responsibilities on land-based pollution reduction and prevention. The core set of responsibilities of the Ministry of Sustainable Development and Tourism, which are relevant also for ICZM, are responsibilities related to environmental protection, spatial planning and management of space, construction, tourism and sustainable development.

The NS ICZM provided for the obligation to establish the Coordinating Body for Integrated Coastal Zone Management, which would have two basic functions:

- serve as an open forum for discussion on integrated coastal zone management topics and priorities,
- analyse and evaluate the documentation, analyses and other relevant materials on integrated coastal zone management that will be sent to the National Council on Sustainable Development, Integrated Coastal Zone Management and Climate Change.

The establishment of this body, which will support both the MSDT in implementation of integrated coastal zone management policy and the National Council, is on-going.

Organization of the institutional system in Montenegro shows that the coastal zone is considered to be an especially significant area. The Public Enterprise for Public Maritime Domain Management is responsible for managing the public maritime domain as the most important part of the coastal zone since 1992. A large number of departments, public administration bodies, institutions and local self-government bodies have responsibilities in managing the coastal zone of Montenegro. Beside the Ministry for Sustainable Development and Tourism, a number of ministries and institutions have responsibilities that are relevant for sustainable use of natural resources what implies also responsibilities for prevention of pollution impacts to coastal and marine ecosystems. The Ministry of Agriculture and Rural Development, Ministry of Transport and Maritime Affairs also stand out in terms of their importance for the coastal zone issues. In addition to the Public Enterprise for Public Maritime Domain Management (future Agency for Coastal Zone Management), other important institutions include the Environmental Protection Agency, Hydrometeorological and Seismological Office, Ecotoxicological Examination Centre, Port Administration and Harbour Master Offices, Institute of Marine Biology (IMB) and Biotechnical Faculty. Particularly important institutions for marine part of the coastal zone are those for navigation safety and security and protection of the sea against pollution from vessels.

Local self-government has an important role in coastal zone management too. Local self-government responsibilities are exercised through the work of different bodies including secretariats for development (and development agencies in some municipalities), secretariats for planning, urbanism and construction, secretariats for municipal affairs, environmental protection and public municipal services (for water supply, waste, sewage, etc.), and many other authorities and bodies. Al-
most all the municipalities in the coastal zone have an environmental department or staff (one or more civil servants) responsible for environmental matters. Municipal inspection operates at the local level.

Supervision and inspection activities are divided between the national and local levels. Directorate of Inspection, which is a body within the Ministry of Economy, is responsible for inspection control at national level. Among others, the following inspection services are of particular importance to coastal zone management are: Urban Planning and Construction Inspection (control of implementation of spatial plans that are adopted at national level), Environmental Inspections (responsible for the control of emissions, waste and protected areas), Water Management Inspection (responsible for work on water infrastructure and water courses and water protection against land pollution), Tourist Inspection, Sanitary Inspection, Inspection of Fisheries, Inspection for the Protection of Cultural Heritage, and others. Overlap and transfer of competencies from one service to another are a common example of the practice. Harbor master office and Navigation Safety Inspectorate are not the responsibility of the Board of Inspection.

Supervision over the legality and effectiveness of the legality of administrative acts for each administrative area within the jurisdiction of the Board for inspection activities is performed by the ministries responsible for a particular administrative area. Supervision of the coordinated work of Directorate for inspection is performed by the Government, through the Ministry of Economy. At the level of local governments operate construction and utility inspection. As the coastal zone is defined as an area of special interest for the state, above-mentioned inspection authorities have special competence in this zone.

5.5 Adopted policies, plans and projects for pollution prevention and control and their effectiveness

Assessment of the midterm status and definition of the objectives and measures defined in this NAP correspond to the measures defined in the relevant national strategic and policy documents. The measures in the NAP are defined starting from existing strategies and plans that are further screened through identifying their relations with the requirements of the SAP / MED and Regional Plan.

The policies and strategies which are the most relevant to support achievement of EO5 and EO10 targets are:

- Strategic master plan for wastewater management in the Montenegrin coastal area and the Cetinje Municipality (2004-2029) to which there are references in 5.1. It stipulates the construction of WWTP for all the communities on the coast by 2029, thus limiting the entry of nutrients.

- The amendments to the Law on Waters adopted in July 2015 define the adoption of the Water Management Strategy, as well as the Water Management Plan within 3 and 2 years, respectively. Deadline for achievement of these goals is by the first update of the strategy and the plan in 6 years.

- The National Waste Management Plan for the period until 2030 which defines the status, needs, targets, as well as the technological
solutions and related scenarios as to enable sound waste management. 

- The National Strategy on Integrated Coastal Area Management and documents and results within CAMP: the NS ICZM defines a set of measures with the aim to improve marine ecosystem status by implementing LBS, putting emphasize on the constructions of waste water and solid waste infrastructure and greening the transport. It also defines mechanisms and measures relevant for building human, administrative and institutional capacities to support integrated coastal zone management.

There are also a number of on-going projects and their outcomes that support achievement of EO5 and EO10 objectives. The most relevant are the projects defined in investment portfolio for implementation of the Strategic master plan for wastewater management in the Montenegrin coastal area and the Cetinje Municipality (2004-2029) and which are classified in those to be implemented before 2020 and after 2020. Some of important on-going projects are the following ones:

- Projects for improvement of water supply and waste water collection at the Montenegrin coast:
  - Phase III (2008-2017) aims at expanding the network H. Novi, Tivat, Kotor and Bar; construction of WWTP for H. Novi (66,300 ES) and Bar (68,600 ES) as well as the sewage drain into the sea in Sutomore (planning documents exist for construction of water treatment facilities for Perast and Risan, and for Petrovac and Sutomore; a water treatment facility in Bar is planned and it requires addressing the matter of infrastructure for (illegal) settlements between Bar and Ulcinj; planning documents also envisage a waste water treatment plant for Ulcinj and for Long Beach (Velika Plaza); the success in implementation will depend on financial abilities of local governments and the budget of Government of Montenegro as well as on the financing from international funds).
  - Phase IV – by June 2016 stipulates the obligation to finalize construction of the secondary WWTP for the outlet at the Trašte bay (72,000 ES) for waste waters collected from Kotor and Tivat. The remediation of collector for Trašte is in the final stage. There are on-going activities regarding the construction of the collector from Meljine to Herceg Novi while water treatment facility is under construction.
  - Phase V (component 2) aims at systemic improvement of the water supply system and waste water collection system in the municipalities of Kotor, Tivat and Herceg Novi, as well as the construction of the wastewater treatment plant in the municipalities of a Kotor, Tivat and Herceg Novi and infrastructure in Ulcinj.
    - A water treatment facility for Budva and Bečići was built at the end of 2014.
    - There are on-going preparations for implementation of the project of construction of the sanitary land fill Duboki Do for Herceg Novi (or alternative location).
Coming to EO9 requirements, beside above listed policies and strategies it is necessary to take note on the following ones:

- National Strategy for Waste Management for the period until 2030 and National Waste Management Plan for the period until 2030 which defines the approaches to all types of hazardous waste management;
- Action Plan for the implementation of the Stockholm Convention (2014-2021) that envisages phasing out of use of all facilities containing PCBs by 2020, development of the study for remediation of the polluted areas by 2018, as well as their remediation by 2021.

A number of projects are relevant to the achievements of EO9 requirements out of which the following ones may be singled out:

- World Bank project which should result with the recovery of polluted locations in the Bijela Shipyard and remediation of pollution at this hot spot, and consequently with reduction of concentration of pollutants in the marine ecosystem.
- Implementation of infrastructural projects of extension of the sewage networks, as well as construction of new wastewater treatment plans in line with the Master Plan for Waste Water Treatment in the Coastal Area of Montenegro.

### 5.6 Existing economic instruments and financing mechanisms for pollution prevention and control measures

The 2008 Law on Environment (OG 48/08, 40/10, 40/11, 27/14) reaffirms the importance of the application of the polluter pays and user pays principles as well as defines a number of environmental policy instruments⁹.

#### Pollution charges

The Law on Environment stipulates that legal and natural persons have to pay compensation for environmental pollution, based on the polluter pays principle. The Law stipulates the payment of pollution charges for:

- Discharge of air pollutants;
- Use of fossil fuels and lubricating oil;
- Use of substances that deplete the ozone layer;
- Generation and disposal of hazardous waste;
- Use of motor vehicles, aircraft and vessels.

Among these, the levy on use of fossil fuels and lubricating oil, a sales tax to be paid by legal persons dealing with trade of these products, was abolished in 2009. Total revenues collected amounted to some €1.2 million in 2008. In a more general way, the removal of this tax was “compensated for” by increases in excise duties on mineral oil products in 2009.

⁹The analysis presented in this chapter relies on the findings of the Third Environmental Performance Review of Montenegro, UNECE, 2015 and Draft of National Strategy for Sustainable Development of Montenegro, 2015
The 1996 Law on Environment had established a fee for investment projects that required an EIA. The fee amounted to 1 per cent of the investment. Revenues were to be paid into a special account of the state budget and earmarked for environmental protection, but this provision was not implemented. This fee, which was not really an economic instrument, is not mentioned in the 2008 Law on Environment and was abolished in 2008.

The Law on Environment provides for the possibility to provide economic incentives, such as subsidies and tax incentives, for enterprises that use or are engaged in trading of environmentally friendly technologies and products. The Law provides also for the use of eco-labelling for environmentally friendly products. None of these options have been implemented to date. The Law on Environment does not explicitly mention charges for water protection which, rather, are established by the Law on Waters (OG 27/07, 32/11) and the Law on Waters Management Financing (OG 65/08).

The application of charges for air pollution, chlorofluorocarbons (CFCs) and hazardous waste has been determined by specific regulation, viz. the Regulation on the amount of fees, method of calculation and payment of compensation for environmental pollution (OG 26/97, 9/00, 52/00, 33/08, 05/09, 64/09, 40/11, 49/11). The Regulation, which dates from 1997, was enforced only as from 2008. This reflected, in a more general way, the concerns of the Government about the weak financial state of the major polluters in the industrial sector. Tax rates for these pollution charges remained unchanged between 2000 and 2007, but they were all raised by 100 per cent as from 2008 and have remained at that level since then.

However, fees for environmental pollution and fees for using natural resources are relatively low, and their collection rate is extremely unsatisfactory. The range of bases for the application of taxes and fees, with special emphasis on taxation of environmental pollution and use of natural resources, is significantly below the possibilities provided by the existing national legislation, and very unlike the positive practices of EU member states. In addition to that, economic instruments based on the polluter/user pays principle are inconsistently applied, which also limits the prospects for the efficient implementation of sustainable production and consumption patterns which would reduce the level of environmental pollution.

The total amount of fees paid for air pollutant emissions, production and disposal of hazardous waste and for importing ozone depleting substances in 2013 amounted only to 0.01% share in GDP. The fiscal system does not provide for the fees for the use of numerous other pollutants and products that have a negative impact on the environment (e.g. packaging waste such as plastic bottles, car tires, batteries and car batteries, and the like).

Legal entities that import and use CFCs are subject to a charge which has been applied since 15 June 2008. The charge rate is €0.9 per kg of imported substance. Import of ozone depleting substances (ODS) requires an import license for which there is an administrative fee of €50. In 2014, there were only two companies engaged in this activity.

Enterprises have to pay a charge of €151.50 per t of hazardous waste generated. Given the lack of ade-

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10 Third Environmental Performance Review for Montenegro, UNECE, 2014
quate treatment facilities, a considerable part of this waste is stored on company premises, and the rest is exported. Waste that is stored on the premises is subject to an additional charge of €75.75 per ton. Companies will have an incentive to export this kind of waste only if the total costs per ton are below the charge rate for leaving the waste on the premises.

Charges for water pollution are due from legal and natural persons that discharge wastewater into water recipients, or manufacture or import fertilizers, chemical plant protection products or phosphate-based detergents. Payments are regulated by the Decision on the amount and manner of calculating water tariffs and the criteria and methods of determining water pollution degrees (OG 29/09). It replaced a 1996 Decree on water pollution charges (OG 15/96), which used a different approach to determining charges for discharge of effluents. The former approach was to set charge rates per kg for each of a number of pollutants and to calculate the effective total charge based on a formula which took into account the measured concentrations of the different pollutants and the pH value in the effective concentration of pollutants and pH value in the recipient, and quantity of wastewater.

The new approach, since 2009, establishes a uniform charge rate of €0.006 per m³ of wastewater discharged. The effective charge rate is calculated based on a formula that measures the pollution content of water discharged. The substances taken into account comprise general organic pollutants (BOD, COD), nutrients (nitrates and phosphorus), heavy metals and suspended solids. Another factor influencing the effective charge rate is the technology used for wastewater treatment, viz. primary stage, secondary (or biological) stage and advanced tertiary treatment. The more advanced the treatment, the lower the effective charge rate per m³ of effluents.

This approach is, however, mainly directed to the future, given the general lack of appropriate measurement of pollution content as well as the lack of WWTPs. In the face of this, the effective charge rates per m³ are almost entirely established by multiplying the basic charge rate (€0.006 per m³) with an industry-specific coefficient used as a proxy for the effluent quality. The higher the coefficient, the lower the effluent quality. The highest coefficient (30) is applied to industries such as metallurgy, production of oil products, textiles and leather, implying a charge rate of €0.180 per m³. A coefficient of 22 is applied to, e.g., wastewater from enterprises in the food and electrical industries. Wastewater from public utility companies that is discharged into sewers has a coefficient of 2, implying a charge rate per m³ of €0.012. In 2007, the corresponding charge rate was significantly lower at €0.0029.

Water pollution fees have also to be paid for the production or import of mineral fertilizers, chemical plant protection products and phosphate-based detergents. The basic fee has been set at €0.0025 per kg (or litter) of these materials.

Revenues from pollution charges

The 1996 Law on Environment stipulated that revenues from pollution charges be paid into a special account of the state budget and used for financing environmental protection. But this provision was not implemented given the non-collection of these taxes. The current Law on Environment does not mention any earmarking of these revenues. Enter-
prises pay pollution charges directly to the State Treasury. Information on the effective bill collection rates are only obtained upon special request to the Ministry of Finance. But this information is not in the public domain.

The annual payments for emissions of air pollutants, use of CFCs and generation and disposal of hazardous waste amounted to 0.01 % share in GDP in 2013, down from to 0.09 % share in GDP in 2012 and 0.02 % in the previous years. The development of these potential revenues over time has been influenced by the varying levels of activity of the major polluters for which bankruptcy procedures were launched in 2013.

The State Treasury also collects revenues from water pollution charges, which are administrated by the Water Directorate of the Ministry of Agriculture and Regional Development. But these revenues are earmarked for the financing of water management. As is the case for the pollution charges mentioned above, there is no direct flow of information concerning these revenues from the State Treasury to the Water Directorate of the Ministry of Agriculture and Regional Development – it is available only upon special request. According to the communication from the State Treasury to the Water Directorate, total revenues from water pollution charges amounted to €2.52 million in 2012 of which €2.3 million was paid by KAP, which is not connected to a WWTP and for which there is no measurement of the actual pollution content of effluents.

**Natural resource use charges**

The use of natural resources is subject to fees, which, according to the Law on Nature Protection (OG 51/08, 21/09, 40/11), should be based on the user pays principle. Use of natural resources requires a permit/licence. In the case of legal entities, user rights are, in general, awarded within the framework of concession agreements for areas such as water abstraction, mineral resource extraction and forest exploitation.

In 2007, water abstraction charges were calculated as a percentage of the “price” of the services or products for which the water abstracted was used. Thus, water used for electricity production was charged at 0.22 per cent of the average price 1 kWh. Water abstraction for bottling of mineral water was charged at 3 per cent of the average price of mineral water. Since 2009, a new approach to setting water abstraction charges has been used based on the Decision on the amount and manner of calculating water tariffs and the criteria and methods of determining water pollution degrees. In general, total payments depend on the volume of water abstracted. Fees for use of water for electricity generation are based on the quantity of electricity (kWh) generated on the grid. There is also a separate charge rate per kW for the use of water for other energy purposes by power plants. Total revenues from these water resource use charges amounted to €1.9 million in 2012. Industrial use and hydropower generation accounted for some 60 per cent of these revenues; public water companies accounted for another 35 per cent.

Charges for the concessions for exploitation of river alluvia (gravel and sand) continue to be based on the volume in m³ of materials extracted. Total revenues from these charges amounted to only €88,100 in 2012. As regards forest resources, the concessions awarded range from 7 to 30 years.
They include the right to forest utilization as well as the sale of timber, but they also comprise the obligation to engage in forest resources management based on forest management plans and strict controlling mechanisms.

The Commission on Concessions within the Ministry of the Economy administers concession contracts, including the collection of revenues. A major problem appears to be inadequate control of the operations of contractors, as well as collection of the fees.

**Municipal waste management tariffs**

The tariff system for waste services distinguishes two main user categories, viz. natural persons (households) and legal persons (such as enterprises and public institutions). Fees continue to be levied in proportion to the size of occupied residential and commercial premises. Waste tariffs for legal persons also depend, in general, on the kind of economic activity they are engaged in.

Average household tariffs for municipal waste collection and transport in Montenegro amounted to €0.063 per m³ in 2012. There are only small variations in household waste tariffs across the country. The average tariff for legal entities was €0.40, much higher than the average household tariff. There are, moreover, significant differences in waste tariffs applied to legal entities, depending on the kind of economic activity involved. The higher tariffs for legal persons do not, generally, reflect higher costs of waste collection and transport; rather, they mainly represent a surcharge designed to subsidize waste collection from households as well as other activities – not related to waste management – undertaken by the waste companies.

Currently applied waste tariffs cover only waste collection and transport to dumpsites, given the general lack of adequate landfills. Bill collection rates for households are quite low, at 63 per cent compared with some 80 per cent for legal entities. It is estimated that, on average, private households currently spend some 1 per cent of their monthly net income on waste services. Data from the household budget survey 2012 indicate that spending on refuse collection amounted to only €2 per month, which corresponded to 0.3 per cent of the average monthly household budget. On average, in Europe, the affordability threshold is set at some 1–2 per cent of the average monthly household budget.

**Charges for Water-works and Sewerage services**

As is the case for municipal waste tariffs, there are substantial cross-subsidies between the two main consumer groups, viz. private households and legal entities. Average water tariffs for private households are significantly lower than those for legal entities, which reflects differences in the corresponding supply costs only partially. In 2012, the average municipal household tariff for Water-works and Sewerage amounted to €0.67 per m³, while the average tariff for legal entities was nearly three times as high at €1.87. Tariffs have nearly doubled in nominal terms since 2005, which has also translated into a substantial increase in real terms, i.e. taking into account the average increase in the Consumer Price Index by some 30% in 2012 compared with 2005. The average costs of Water-works and Sewerage services mask only modest tariff levels
for sewerage services, given the widespread lack of wastewater treatment facilities.

Bill collection rates have improved in recent years. They are now quite high in some municipalities in the southern coastal region (e.g. 98 per cent in Budva and 96 per cent in Kotor in 2012), where the water sector infrastructure was significantly improved with foreign financial and technical assistance during recent years as well as advisory services provided by Vodacom. Efforts were also made to improve the financial sustainability of water companies based on tariffs that moved closer to cost recovery levels.

A major challenge is to reduce the large gap between the volume of produced water and the volume that is invoiced to consumers. The main reasons for this large gap are deficiencies in the water transport network (technical losses) as well as unregistered and illegal connections to the network, and inaccurate metering of water consumption (administrative losses). Illegal connections to the water supply system seem to be a major problem. The average share of non-revenue water is estimated at some 60%, but there is likely a large margin of uncertainty in this indicator.

According to the household budget survey 2012, households spent €8, on average, on water supply, corresponding to 1.3 per cent of the average monthly household budget. But water tariffs vary considerably across the country, leading to large differences in water bills among regions. The affordability of water bills is, however, difficult to gauge, given the lack of regional income statistics. To ensure their adequate supply with water, vulnerable persons can benefit from municipal subsidies.

**Some of other charges**

Excise taxes on fossil fuels are a big portion of the fees and constitute about 6% of GDP (2013), but excise taxes on motor fuel and diesel fuel for motor vehicles are used for road construction, instead of being used also for remediation activities to resolve the adverse effects on the environment associated with the burning of fossil fuels.

Public procurement in Montenegro in 2012 represented about 12% of GDP. Although the Law on Public Procurement provides for the possibility to use the criteria related to environmental protection and energy efficiency, this option is not sufficiently used in practice.

There is no system of subsidies for clean technologies, alternative fuels, means of transport, use of renewable energy sources and sustainable waste disposal.

**Budget allocations for environmental protection**

Budget allocations for environmental protection in 2013 amounted to only 0.3% of total allocations from the Budget of Montenegro i.e., to 0.16% of the GDP. A total of 0.62% and 0.43% from the total allocations in the budget of Montenegro were allocated in 2011 and 2012 respectively. Allocations at
the local level are significantly lower, even in some developed areas. For the overall activities related to the remediation and protection of the environment (remedial measures of industrial pollution, remediation of municipal waste, marine pollution prevention and clean-up measures) in the 2011-2012 period, only 0.88% of the local government’s budget was allocated in Budva, in Herceg Novi 0.65%, and in Ulcinj 0.75%. Out of a sample including 21 polled polluters, 13 responded and only 3 polluters had information on the allocations for the environment in the form of fees and investments into environmental protection projects\textsuperscript{12}.

Although the 2008 Law on Environment provided for a sustainable system of environmental finance, including the establishment of an environmental fund - eco-fund, no advance has been achieved so far. Aiming to improve environmental finance, this area was further governed in the proposed new Law on Environment, the adoption of which is being prepared.

\textsuperscript{12}Base analysis "environmental pollution", National Strategy for Integrated Coastal Area Management of Montenegro, 2014.
Identification of Gaps
BLUE HORIZON BEACH | SOURCE: VIJESTI (SINIŠA LUKOVAC)
6. Identification of Gaps

Gaps were identified in accordance with the approach presented under points 2.2, 2.3 and 4.3 on the basis of a short list of problems that characterize the current situation found in the midterm baseline assessment. Identification of gaps was the starting point for setting operational targets and formulating the related measures necessary to meet the legally binding obligations of the SAP/MED and Regional Plans in the time frame of the NAP. An overview of identified gaps of technical, policy/institutional/legislative or economic nature, grouped in relation to certain ecological objectives relevant to the NAP - EO5, EO9 and EO10, is given below. In such a manner the key gaps were identified for each ecological objective between applicable SAP-MED provisions, Regional Plans commitments and expectation of EcAp-GES targets of the one hand, and midterm assessment findings of the other.

Two groups of general gaps common for all 3 ecological objectives can be singled out:

- national regulations did not fully comply with the requirements of the Regional Plans.
- Montenegro cannot achieve all relevant SAP-Med and RPs requirements that are planned until 2020, as well as those that are planned until 2025, since some of the most important national official strategic documents set out different timelines.

6.1 EO5 Related Gaps

Technical gaps

- Projects for construction of sewage network and wastewater treatment plants have been partially implemented (so far only one wastewater treatment plant in Budva has been constructed and put in operation). All coastal agglomerations with more than 2,000 inhabitants do not have waste water treatment facilities as it is the case in Budva.
- It is not possible to give exact projections of targets related to the construction of sewerage system and waste water treatment plants per year until 2020 and 2025 since a slight progress is achieved until now, while a number of on-going projects are in documentation phase and their implementation depends on the success of fundraising.
- According to existing circumstances, the completion of the sewage network and the construction of WWTP in Ulcinj will be possible only after 2020. That is an obstacle for rehabilitation of Port Milena - type A hot spot, as well as for improvement of the tourism attractiveness of Ulcinj.
- Njivice and Sutorina settlements in Herceg Novi are not connected to the sewerage system; that is unacceptable because of the potential negative pollution impacts on healthy mud and mineral waters in this area.
- So far there is no separate collection of sewage and rainwater, especially in the Kotor Bay, while re-use of treated water has not been put in place.
- Although the number of food sector installations is small, they discharge into the sewerage system. However, there is no precise evidence on waste waters from food sector.
- Training sessions aimed at increasing awareness on the technological solutions for reusing treated water from WWTPs are insufficient.
- BAT and BEP for waste treatment that is generated in the process of wastewater treatment are not applied sufficiently.

Institutional and policy gaps

- There is a gap in terms of the efficient monitoring of the inflow of nutrients and contaminants into the marine ecosystem and monitoring of marine biodiversity in order to determine marine water pollution trends. This gap is followed with another one – lack of comprehensive reporting on the state of the marine ecosystem due to the lack of implementation or partial implementation of certain elements of the marine ecosystem monitoring programme since 2012, and due to the fact that harmonisation of the marine ecosystem monitoring programme with EcAp/IMAP and MSFD is yet to take place.
- There is a lack of continuous monitoring of the Bojana River’s inputs of pollution load into the sea since the monitoring station for the Bojana River water control is not in operational due to lack of financial resources.
- There is no monitoring of water quality of storm water sewer lines which drain into the sea without prior treatment.
- Monitoring of wastewater quality from main sewage outfalls into the sea in all settlements in the coastal region is controlled only twice per year although it should be controlled each month. The situation is even worse with many short sewage outfalls since the wastewater quality is not controlled at all.
- The official determination of agglomerations according to the Directive 271/91/EEC is not finalized.

Legislative gaps

- National regulations and institutional set up are not supportive to EcAp implementation and EcAp objectives, targets and indicators are not integrated into national regulations.
- The transposition of the EU MSFD into national legislation has not taken place yet.
- National regulations do not recognize the problem of marine litter, although it is a precondition to introduce measures to prevent its entry into the river flows or into the sea, including the Decree on classification and categorization of surface and ground waters (Official Gazette of the Republic of Montenegro 02/07).
- Rulebook on the quality and sanitary-technical conditions for waste water discharge into the recipient and public sewage system, method and procedure of testing waste water quality, minimum number of tests and the contents of the report on the determined waste water quality (Official Gazette of Montenegro 45/08 and 9/10, 26/12 and 56/12) does not particularly define ELVs for the food industry.
- This Rulebook does not define ELVs for the inflow of nutrients (NO$_2$, NO$_3$, NH$_4$ and PO$_4$)
in the natural recipient – water of categories 1, 2 and 3 in accordance with the WFD.

- National regulations do not address the matter of connecting all sewerage outfalls to main sewerage collectors and the construction of a waste water treatment facility for all settlements with more than 2,000 inhabitants has not been addressed.

- National regulation does not provide for mandatory monitoring of pollutant emissions from the main sewage outfalls minimum 2 times a year to assess the input of pollution into the sea.

6.2 EO9 Related Gaps

Technical gaps

- There is no commonly accepted technical proposal for sound management and treatment of hazardous waste from industrial facilities (e.g. from Bijela Shipyard, Daido Metal, Port of Bar, Port of Kotor, Container Terminals in Bar, Hemosan), including waste containing PCBs; World Bank implemented Industrial Waste Management and Clean-up Project (IWMCP) is expected to propose it.

- Registration of POPs stocks and hazardous waste containing POPs and POPs elimination has not been done in accordance with the National Implementation Plan for the Stockholm Convention.

- There is a lack of educational/ training programmes on identification, management and use of POPs.

- Inadequate emergency equipment in case of accidental pollution in ports, especially from hazardous chemicals and fuels in the Port of Bar.

Institutional and policy gaps

- There is no systemic monitoring (lack of financial resources) of the stocks of prohibited chemicals and no detection of possible new stocks and locations. After 2011 there is insufficient and inadequate monitoring of contamination of water, biota and sediments with regard to the contents of priority substances, organometallic compounds and organotin compounds.

- Lack of BAT and BEP and for transfer of cleaner/new technologies application in industrial facilities and other operators and companies.

- Insufficient and inadequate control of emissions from land sources into the air, water, sea and soil.

- Inadequate monitoring of the coastal environment regarding WFD requirements while MSFD and EcAp are yet to take place (comprehensive monitoring of the state of marine environment, which takes into account monitoring of air quality, has not been established). The continuity and quality of the monitoring programme have been threatened by implementation of the public procurement procedure.

- Lack of real data for developing the National Emissions Inventory within the implementation of the LBS Protocol (NBB).

- Overlaps in institutional responsibilities for environmental monitoring, including control of water bodies’ pollution (e.g., responsibilities of the MSDT and Ministry of Rural Development and Agriculture; EPA and Water Management Directorate).

- Insufficient inspection control of the state of existing locations of hazardous waste, in-
including waste of grit containing organometallic compounds and stocks of waste with PCBs contents, as well as unintentionally produced POPs: HCB, PeCB, PCDD and PCDF, in Bar, Bijela Shipyard, Hemosan and the electric power transformer stations on the coast.

- There is no IT system on chemicals management in Montenegro.
- There is a lack of scientific and research programmes of the marine ecosystem.
- There is a lack of programmes for building capacities of national institutions for implementation of Integrated Monitoring and Assessment Programme, compatible with activities towards transposition of MSFD, instead of the MEDPOL programme which was implemented in the national context until 2011.

**Legislative gaps**

- National regulations do not prescribe the standard contents of organometallic compounds of Hg, Pb and Sn in sea water and in the wastewater, land, sediment and biota.
- National regulations do not prescribe MPC on POPs contents and contents of other dangerous substances in sediments, while they do partially define MPC\(^{13}\) in shells and other marine organisms.
- National regulations do not prescribe obligations to dredge the polluted sediment from the sea and to clean, dispose or destroy it in an environmentally acceptable manner.
- Inconsistency of national assessment of the bathing water quality and the 2013 Programme of systematic examination of quality and quantity of surface and ground water in Montenegro with the Decision IG.20/9 of Contracting Parties to the Barcelona Convention; national system defines 3: C1, (int. ent/100ml<100 and ech. coli/100ml<200), C2 (int. ent/100ml<250 and ech. coli/100ml<500) and "outside class", and the Decision IG 20/9 defines 4 classes: A, B, C, D (A-excellent <100cfu/100ml; B-good 101-200 cfu/100ml, C-sufficient 185 cfu (for 95%), D > 185 cfu-Poor (90%)).
- Incompletely and inadequately defined competences with regard to monitoring of bathing water quality: the latest amendments to the Law on Waters have caused the Public Enterprise for Coastal Zone Management to lose the legal grounds under which it was funding monitoring of bathing water quality, which is aligned to a significant extent with the requirements of the Barcelona Convention/MEDPOL Programme and of the Directive 2006/7/EC concerning the management of bathing water quality. Hence, a by-law defining the programme for bathing water monitoring has not been passed in accordance with the requirements of the Barcelona Convention/MEDPOL Programme and of the Directive 2006/7/EC concerning the management of bathing water quality.
- Preparation of profiles of beaches in bathing areas is not fully harmonized with the Decision IG.20/9 of Contracting Parties to the Barcelona Convention.

\(^{13}\) Maximally permitted concentration
6.3 Air Pollution Related Gaps

Technical gaps

- Insufficient promotion of use of fluid gas, electricity and other alternative forms of energy in vehicles.
- Public transportation in coastal area is not adequately organized, and alternative sources, including green mobility technologies, are not used.
- Inadequate equipment for control of combustion gases in most facilities for technical examination of vehicles.
- There is no appropriate restriction on import of vehicles from the EU which do not meet the green transportation standards.
- Insufficient coverage of the coast with monitoring stations to control air quality.

6.4 EO10 Related Gaps

Technical gaps

- Construction of waste management infrastructure is not completed, including lack of a waste incineration plant.
- Numerous (37 registered) improperly managed waste disposal sites (illegal dumps) detected but have not been closed and remediated yet; the 2015-2020 National Waste Management Plan defines only remediation of the Čafe dump and funds are planned for that purpose.
- Implementation of primary waste selection and re-use and recycling is still at a very low level (less than 3% nationally).
- Despite the fact that most of the local governments use containers for the primary selection of components of municipal waste (paper, cardboard, metal, plastic, glass), either individually or as part of recycling islands and/or yards, the collection of selected fractions is not done separately but with the selected containers and waste containers with mixed waste which are emptied at the same time, so the selected part of waste then ends at one of the depots. Podgorica and Tivat are exceptions, as in these cities this activity is carried out with relative success.
- The selected fractions are not collected separately. Instead, containers with selected waste and the ones with mixed waste are emptied at the same time. Thus, the selected part of waste ends up in one of the landfills afterwards.
- For now, there are only three (3) recycling facilities for secondary selection: one (1) in Podgorica, one (1) in Herceg Novi and one (1) in Kotor.
- Insufficient measures for regulation of solid waste input into the sea via torrential flows.

Institutional and policy gaps

- Lack of equipment in local municipal enterprises/inspectorates; insufficient personnel capacities of the Environmental Inspectorate;
- Adequate incentives are not established to support return packaging composed of: glass, plastic, metal;
- There are inadequate incentives to collect inadequately disposed waste which can be recycled afterwards;
Inadequately organized purchase of selected recyclable materials, as well as lack of stimulating tax measures for retailers who purchase the old packaging and send it for recycling;

Inadequate processing industry interest in the purchase of raw materials;

Lack of a programme for removal of existing illegal solid waste dumps in the coastal area and developed projects for remediation of dumps in order to seek financial support;

Inadequate penal policy, especially for illegal disposal of waste in the environment, as well as insufficient human capacities for efficient inspection controls;

Insufficient promotion of use of equipment for handling secondary raw materials (plastic, metals, glass, etc.);

Lack of contribution of local governments, population and non-governmental organizations to cleaning up beaches from marine litter;

Lack of sufficient number of containers for separation, or at least partial waste separation (it cannot be expected that people will carry garbage 2-3 blocks from their building or neighbourhood for purposes of waste selection);

Local municipalities do not provide adequate financial resources for the establishment of infrastructure for waste water and solid waste management;

There are no mandatory measures for use of small capacity devices for waste water purification in homes and restaurants placed at the Bojana River banks. Strict prohibitions are not prescribed for discharge of solid waste into the Bojana River;

Lack of knowledge about the dredging sediments practices and possible negative effects on the marine biodiversity;

Inadequate and insufficient education of children, starting from preschool education, as well as education of the broader population on sound waste management;

Insufficient voluntary actions of NGOs and schools and other civil society organizations related to the promotion and support of secondary raw materials' collection, in particular plastic;

Insufficient involvement of local communities, fishermen and other stakeholders at local level.

Legislative gaps

Lack of legislative norms for dredging sediments, treatment of the dredging material and preventive measures for the protection of marine organisms in cases of dredging sediments;

Lack of a procedure for treatment of hazardous waste on illegal landfills and for illegal waste disposal into the sea;

6.5 EO5, E09, EO10 Public Participation, Monitoring, Public Awareness, Public Access and Reporting Related Gaps

Public participation gaps

Insufficient level of interest of the public to exercise its right to access information;

Still insufficient level of public interest in getting involved into environmental protection and management.


**Monitoring gaps**

- Inadequate technical and financial capacities for implementation of the marine and coastal environment monitoring programme;
- There is no database of issued authorizations and regulations. The control of requirements and conditions defined in issued authorizations and regulations is not done by EPA. Environmental Inspectorate occasionally controls the requirements and conditions defined in issued authorizations and regulations;
- Regular monitoring of surface and ground waters is not established in accordance with the EU Water Framework Directive (WFD);
- Monitoring of surface and ground waters is not organized in accordance with the WFD;
- Monitoring of the quality of surface and ground waters must be incorporated into the National Environmental Monitoring Programme of Montenegro, which is the responsibility of the Environmental Protection Agency. Regular monitoring of surface and ground waters is not established in accordance with the WFD.

**Public awareness gaps**

- Insufficient public awareness about the negative impact of marine litter and the importance of use of sustainable consumption and production schemes;
- Lack of knowledge on SCP practices and tools of relevance for marine litter management.

**Public access gaps**

- Insufficient level of interest of the public to exercise its right to access information;
- Insufficient promotion of available data;
- Insufficient interest of the media in environmental issues;
- No integrated and organized (e.g. through the use of GIS) database on the status of marine and coastal environment;
- Imprecise statistical data;
- Differences in data scored by EPA and MON-STAT (official statistical data);
- Absence of organized database.

**Reporting gaps**

- Lack of reports on the state of marine and coastal environment, including an analysis and observation of pollution trends and their impacts on environment due to insufficient data;
- Integrated information system on the quality of environment is not established in EPA;
- The existing reporting system established by UNEP/MAP does not provide for consolidated reporting in accordance with different requirements of the Barcelona Convention and Protocols and the relevant Contracting Parties’ Decisions.
Operational Targets
7. NAP Operational Targets

As explained under point 4.3, the 2015 NAP operational targets were grouped by ecological objectives. The above listed gaps indicated to a number of obstacles that prevent efficient achievement of GES targets related to EcAp objectives. Gaps have been grouped into technical, institutional, policy and legislative ones.

Partially implemented projects for construction of sewage network and waste water treatment plants and absence of waste water treatment facilities in all coastal agglomerations with more than 2,000 inhabitants still generate the strongest pressures and negative impacts on the marine ecosystem. This is the main obstacle for achievement of EO5 and related 6 GES targets on reduction of eutrophication. The same was determined in the 2013 NBB by calculating the pollution load. It actually corresponds to the failure in achieving the operational target from the 2003 NBB related to 50% reduction of and nutrient emissions. Further on, specific technical gaps have been identified for each municipality and related measures were ranked and subsequently translated into relevant investment projects. In this group of technical gaps a significant one is related to lack of rehabilitation of Port Milena - type A hot spot. Lack of appropriate infrastructure in Boka Bay increases sensitiveness of this area. Also, lack of sewerage system in Njivice and Sutorina settlements in Herceg Novi increases pollution impacts on the healthy mud and mineral waters in this area.

Specific institutional and policy gaps are mainly connected to absence of efficient monitoring of the inflow of nutrients and contaminants into the marine ecosystem, monitoring of marine biodiversity in order to determine marine water pollution trends, as well as to the lack of comprehensive reporting on the state of the marine ecosystem and harmonization of the marine ecosystem monitoring programme with EcAp/IMAP and MSFD, lack of continuous monitoring of the Bojana River’s inputs of pollution load into the sea, monitoring of water quality from storm water sewer lines, monitoring of the quality of waste water from main sewage outfalls, etc.

Legislative gaps are related to non-harmonization of national regulations with EcAp and EU MSFD, absence of legislative norms for marine litter, lack of ELVs for inflow of nutrients (NO$\textsubscript{2}$, NO$\textsubscript{3}$, NH$_4$ and PO$_4$) in the natural recipient – water categories I, II and III in accordance with the WFD, inadequate jurisdiction over control of the surface and ground waters pollution, etc.

The appropriate operational target was defined as a response to this group of technical gaps:

- **EO5/MW1: Reach the share of treated waste water represents 60% of the total waste water, and the percentage of connections to the sewerage system to 75-80% by 2020.**

In order to enable reduction of contaminants from land-based sources and their impacts on the marine ecosystem, three operational targets have been set so as to achieve 5 GES targets related to EO9. Operational targets have been set based on the recognition of technical, policy, institutional and legislative gaps.
The group of technical gaps lacks a commonly acceptable technical proposal for sound management and treatment of hazardous waste from industrial facilities including waste containing PCBs. The group of problems related to these gaps exerts the strongest pressures and negative impacts on the marine environment.

Institutional and policy gaps are related to absence of systemic monitoring of prohibited chemicals stocks and insufficient and inadequate monitoring of contamination of water, biota and sediments with regard to the contents of priority substances, organometallic compounds and organotin compounds. There is also insufficient and inadequate control of emissions from land-based sources into the air, water, sea and soil while monitoring the coastal environment regarding WFD requirements. The MSFD and EcAp are yet to take place.

Identified legislative gaps in national regulations are: lack of provisions governing the standard contents of organometallic compounds of Hg, Pb and Sn in sea water and in waste water, land, sediment and biota and ELVs on POPs contents and contents of other hazardous substances in sediments, while ELVs in shells and other marine organisms are partially defined. There is inconsistency of national assessment of bathing water quality and the 2013 Programme of systematic examination of quality and quantity of surface and ground water with the Decision IG.20/9 of Contracting Parties to the Barcelona Convention, as well as incompletely and inadequately defined competences with regard to monitoring bathing water quality.

Starting from the above-mentioned gaps, three operational targets have been defined:

- **EO9/PO1**: Progressively reduce existing PCBs stocks so as to ensure their full elimination by 2025
- **EO9/ID1**: Reduce hazardous substances emissions from Bijela Shipyard into the sea and sediment by 70% by 2020 and ensure their remediation, including sound control and management of future pollution by 2025
- **EO9/BW1**: Reach good environmental status of the marine ecosystem by 2025

With regard to GES targets on decreasing marine litter impacts on the coast related to EO10, a number of technical, institutional, policy and legislative gaps have been identified. Lack of infrastructure for waste management, existence of improperly managed waste disposal sites (illegal dumps), low level of primary waste selection and re-use and recycling, and insufficient measures for regulation of waste inputs by torrential flows are priority problems. Responses to these problems are provided in the 2015 NAP.

The most significant institutional and policy gaps which can be singled out include lack of equipment in the local enterprises/inspectorates; inadequate incentives to support return packaging composed of: glass, plastic, and metal and to collect inadequately disposed waste, and inadequate penal policy.

National policy and the waste management action plan provide the basis for setting a quantified operational target for municipal waste. Thus, there is an operational target for EO10 that sets out the obligation to have minimum 98% of municipal waste collected and 50% of municipal waste collected to
be recycled. Obligation to minimize run-off and river inputs of solid waste by 2020 was imposed due to lack of precise and continuous measurements of river inputs. Also, following official national policy documents the 2015 NAP imposes the obligation to fully eliminate improperly managed solid waste disposal sites in the coastal area. Thus, the operational targets related to EO 10 have been set as follows:

- **EO10/SW1**: Enable at minimum 98% municipal waste collection in urban areas, and 50% share of recycled collected municipal waste, such as paper, metal, plastic and glass by 2020
- **EO10/SW2**: Minimize run-off and river inputs of solid waste in order to reduce marine litter impacts and pressures to marine ecosystem by 2020
- **EO10/SW3**: Eliminate improperly managed solid waste disposal sites in coastal area by 2020

Given a lack of sufficient number of air pollution measurements from the transport sector the 2015 NAP sets the following operational target: **AP1**: Enable continual reduction of air pollution from transport (at land and sea) by 2020

Following the gaps identified in the midterm baseline assessment concerning monitoring, reporting, public participation, public awareness and public access and which are common to all three ecological objectives, NAP sets the following operational target:

- **Improve monitoring and pollution prevention and control of the marine environment by 2020.**
Programme of Measures
8. Programme of Measures

The detailed midterm baseline assessment enables:

- to identify gaps of technical, policy/institutional/legislative or economic nature, grouped on the basis of problems that characterize the current situation, as a first step, and
- to identify operational targets, as presented in chapters 6 and 7, as the second step.

Information organised in that manner for each of the legally binding requirements of SAP/MED and Regional Plans provided the basis for determination of measures aimed at bridging each gap or a group of interrelated gaps and solving problems related to them in the time frame of the 2015 NAP. As presented under point 3.2, measures from the 2005 NAP are mostly partially implemented or not implemented. Such a situation associated with the compounded legally binding requirements of the SAP/MED and Regional Plans resulted in recognition of a number of new potential measures. Fact Sheet B provides a form for linking the potential measures with the operational targets and related ecological objectives.

The measures identified:

- technical needs related to necessary investments so as to provide or improve the existing environmental infrastructure, provide sanitation and remediation of existing hot spots, to reduce pollution effects on marine and coastal environment and population health, etc.;
- needs to improve the existing legislation or to adopt new legal acts as to enable compatibility with legally binding requirements of SAP/MED and Regional Plans;
- needs to upgrade the existing institutional organization to make it sufficiently efficient;
to implement legally binding requirements of SAP/MED and Regional Plans in terms of equipment, human and financial resources, capacities, etc. or in terms of improving the existing strategies and policies.

Once appropriate measures have been defined in Fact Sheet B, they were aggregated into technical, policy, legislative, institutional and economic ones in the form of Fact Sheet C across all operational targets under a single EO first, and then under all EOs. While integrating them, the need to enable integration horizontally between sectors and vertically from local to national levels was taken into account. One simple criterion was applied to aggregation - whether a single measure is dependent on another for the achievement of an operational target to which they are related or not. Administrative hierarchy for each aggregated measure was defined depending on whether implementation is necessary at the local or national level.

Since measures have been formulated by avoiding fragmentation and providing their exact and clear links to operational targets and identified gaps, it was not necessary to shortlist aggregated measures. As already explained, the total set of aggregated measures enables a comprehensive programme for efficient fulfilment of operational targets, and none of the proposed measures should be eliminated. Therefore, after aggregation, measures have been prioritized and ranked based on the categories and criteria that are presented above under point 4.3. Prioritization was done in the form of fact sheet D. Detailed prioritization and ranking methodology are explained under point 4.3.

- Implementation costs for all aggregated measures have been assessed and presented in sub fact Sheets D that were created to apply group of criteria 7. In explanation, in order to classify aggregated measures by applying this group of four sub-criteria, it was necessary to assess implementation costs of each aggregated measure. The assessment was based on:
  - data available in the existing strategies and plans, as in cases of solid waste and wastewater infrastructure projects,
  - projected costs for sanitation and remediation, introduction of clean technologies, transfer of knowledge, institutional building based on experience in implementing similar activities in Montenegro or in the SEE region,
  - the cost of equipment and services in the market in Montenegro or in the SEE region.

Apart from the total costs' estimate, funds provided thus far and missing funds were identified when available data allowed doing so. Financially, the most demanding are technical measures, followed by other groups of measures in the following order: institutional, policy, legislative and economic ones.

Based on the results of application of prioritization criteria, measures have been ranked in the Fact Sheet E. The measure with the highest score is ranked as the first one, and other measures are listed in order that follows the descending score of ranking results for each of them. The same priority number is associated to the measures with the same ranking score. Measures that are ranked in fact sheet E are new measures or measures that were defined in the 2005 NAP and now upgraded.
with new measures due to new legally binding requirements of Regional Plans that were added to SAP/MED requirements. Each measure is associated with follow-up indicators.

8.1 Aggregated Measures

The 2015 NAP consists of 46 aggregated measures categorized into 14 prioritization categories. The measures are presented in Fact Sheet E and listed below.

Priority Number 1

**EO9/ID1/M1, EO9/ID1/M2, EO9/ID1/M3, EO9/ID1/M4, EO9/ID1/M5, the abbreviated code: ID1**

Remediate contaminated industrial site of Bijela Shipyard in the period 2020 - 2025 including implementation of the priority actions as follows:

- Determine the contamination level and propose remediation measures for Bijela Shipyard by 2017;
- Enable environmental friendly treatment of the non-hazardous waste disposed in the Bijela Shipyard by 2019;
- Export or ensure safe permanent disposal of dangerous industrial waste from Bijela Shipyard by 2020 (currently disposed waste of around 64,000 t of grit and additional quantities of grit that will be generated until 2020, as well as the stocks of around 160 t of heavy fuel oil and PCBs stocks);
- Eliminate organotin compounds (OTCs) from soil and sediment in Bijela Shipyard, by reducing their quantity by 20% at annual level by 2020;

- Remediate land and sediment in the Bijela Shipyard (hot spot B) in period 2021 - 2025; If necessary and economically viable, dredge the sediments from the sea which also contain contaminated grit, enable its temporary and safe disposal until permanent solution is found.

Priority number 2

**EO5/MW1/M8, EO5/MW1/M9, the abbreviated code ID: MW1**

a) Remediate the Port Milena channel (hot spot A) and assess need to connect it to the Bojana River by 2030;

b) Improve the sewage system and waste water treatment in Municipality of Ulcinj by enabling:

- Construction of sewerage network for four settlements (Kodra, Totoši, Bijela Gora, Bratrica) by 2020 in order to eliminate impacts of waste waters entering the Bratica stream and over Bratica stream into Port Milena;
- Filtering wastewater from sewage outfalls to which hotels at Velika Plaza and Štoj are connected in order to reduce waste water impacts to Port Milena channel before this problem is permanently resolved by providing connection of this hotels to sewerage network by 2020;
- Rehabilitation of the main collector for sewage at PS Private which discharges into the sea at location Đerane; rehabilitation of existing submarine outfall in Đerane and construction of 5 PSs;
- Construction of WWTP in Ulcinj (37,500 PE) by 2020;
- Extension of the sewage network to whole Municipality of Ulcinj and construction of WWTP (97,500 PE) by 2025;
- Continuing development of sewerage network in the settlements where sewerage network is not constructed, separate sewerage and storm sewer.

**Priority number 3**
EO5/MW1/M1, EO5/MW1/M2, EO5/MW1/M13, the abbreviated code: MW2

Improve the sewage network and waste water treatment in Municipality of Bar by:

- Expanding the sewage network for town of Bar: construct 31.5 km of waste water and sewerage network, construct pumping stations 4 (PS), separate sewage and storm sewer, reconstruct the existing sewerage system by 2020;
- Construction of the WWTP for town of Bar (68.600 PE) by 2020;
- Construction of the sewage network and outfall in Sutomore by 2020;
- Construction of the WWTP (18,750 PE) in Sutomore by 2020 in the first phase and WWTP (29000 PE) in Sutomore by 2025 in the second phase;
- Construction of the sewage system with primary and secondary collectors and construction of the WWTP for Dobre vode by 2020.
- If it is found as appropriate enable wastewater treatment in the camp settlements with eco-remediation measures.

**Priority number 4**
EO5/MW1/M17; EO5=E09=E010=Mo = Re/M20; PP= PAw=PAcc1/M1; EO5=E09=E010=M = Re/M20;
PP= PAw=PAcc1/M18; EO9/BW1/M7, the abbreviated code: Σ\textsuperscript{14}1,BW1

EO5/MW1/M3, EO5/MW1/M10, the abbreviated code: MW3

Improve the sewage network and waste water treatment in Municipality of Kotor and Tivat by enabling:

- Improving functionality of the main sewer system for the collection and drainage of wastewater in Kotor and Tivat (construction of 17.6 km of sewage network, construction of 6 large and 6 small PS) and connecting it to the Trašte outfall by the end of 2016;
- Construction of the WWTP for waste waters from Kotor and Tivat at Trašte Bay (72,000 PE) by 2017;
- Construction of the WWTP (3500 PE), sewerage and storm drainage network for agglomeration Radovici, Milovići, Bigova and Lepetane;
- Continuing development of sewerage network in the settlements where sewerage network is not constructed, separate sewerage and storm sewer;
- If it is found as appropriate enable wastewater treatment in the camp settlements with eco-remediation measures.
Improve national legislation as to support EcAp and MSFD implementation and improve bathing water quality by:

- Adopting new legal act/amending existing ones as to introduce EcAp/IMAP into national legislation, as well as to harmonize national legislation with requirements of EU legislation, primarily EU MSFD and EU WFD by 2018,

b) Harmonizing national legislation on bathing water quality with the requirements of EC Bathing Water Quality Directive and Decision on Regional plan “Criteria and Standards for bathing waters quality in the framework of the implementation of Article 7 of the LBS Protocol “ (IG 20/9) by 2019.

**Priority number 4**

EO5/MW1/M23, EO9/BW1/M2, the abbreviated code: MW4,BW2

Enable sufficient and sustainable financing to support implementation of investment projects of sanitation and waste water treatment in the coastal area in accordance with the dynamics defined in the official policy documents (master plans and policies for waste water, waste and sanitation).

**Priority number 5**

EO5/MW1/M6, EO5/MW1/M7, the abbreviated code: MW5

Improve the sewage network and waste water treatment in Municipality of Herceg Novi by enabling:

- Construction of 35.3 km of sewage network with 13 PSs and 1 submarine outfall by 2017;
- Construction of wastewater treatment plant for Herceg Novi (65,000 PE) by 2017;
- Connection of the settlements Sutorina and Njivice to the main sewer until 2020;
- Continuing development of sewerage network in the settlements where sewerage network is not constructed, separate sewerage and storm sewer;
- If it is found as appropriate enable wastewater treatment in the camp settlements with eco-remediation measures.

**Priority number 4**

EO5/MW1/M17, EO9/BW1/M6; EO5=EO9=EO10=Mo = Re/M20=PP= PAw=PAcc1/M1;
EO5=EO9=EO10=Mo = Re/M20=PP= PAw=PAcc1/M18, the abbreviated code: Σ2

Improve integrated coastal zone management policy by:

- Establishing Integrated Monitoring and Assessment Programme (IMAP) on marine ecosystem status in accordance with Barcelona Convention requirements by 2018 and transpose MSFD into national institutional context by 2020;
- Strengthening research programmes of marine environment as to support IMAP implementation and achieve good environmental status in accordance with MSFD.
Secure:

- Sustainable financing of measures defined in NAP relying at large extent on the external source of financing (e.g. regional projects supported through existing partnership mechanisms in Mediterranean region)

- Continual financing of IMAP and MSFD implementation from public sources, with external support in first 3 years (through regional projects and MAP support).

**Priority number 6**

EO5/MW1/M19; EO5=EO9=EO10 =Mo=Re=PP=Aw=PAcc1/M3=M2;EO9/BW1/M9;
EO5=EO9=EO10=Mo=Re=PP=PAmw=PAcc1/M10, the abbreviated code: Σ5, BW5

Strengthen institutional capacities as to efficiently implement the Integrated Monitoring and Assessment Programme (IMAP) on marine ecosystem status in accordance with Barcelona Convention requirements by 2018 and transpose MSFD into national institutional context by 2020.

**Priority number 7**

EO10/SW1/M1, EO10/SW1/M2, EO10/SW1/M3, EO10/SW1/M4, EO10/SW1/M5, the abbreviated code: SW2

- Develop infrastructure for primary and secondary waste collection in accordance with the activity plan defined within the National Waste Management Plan for the period until 2020; in the process of primary waste selection introduce the principle of two bins – dry and wet (transition from the model of primary waste segregation into several different containers designated for specific type of waste components (separately for glass, PET, metal, paper), to the principle of “two bins” for separate collection of dry and wet fractions).

- In accordance with the activities defined in the National Waste Management Plan for the period until 2020 the following priority actions will be taken in the coastal area:

  - Construct regional recycling centre, the composting and anaerobic digestion facility (MBT) and remediate dumpsite in Bar;
  - Construct the recycling yard with sorting facility in Ulcinj;
  - Construct transfer station in Herceg Novi;
  - Construct composting facility in Kotor;
  - Construct the recycling yard with sorting facility in Ulcinj;

**Priority number 8**

EO5/MW1/M11, EO5/MW1/M12, the abbreviated code: MW6

Improve the sewage system in **Municipality of Budva** by enabling:

- Construction of the sewage system and WWTP for 16000 PE for settlements Petrovac and Buljarica;
- Construction of the sewage network, replacement of short outfalls with submarine outfall and reconstruction of existing system
for separation of atmospheric and waste waters by 2020;
- Connection of settlements Sveti Stefan, Reževići, Drobnići, Pržno, Rijeka Reževića, Prijedor, Krstac to the sewage network of Budva and their connection to WWTP Vještica, that is recently constructed, by 2025.

**Priority number 8**
**EO10/SW3/M1, the abbreviated code: SW3**

Remediate of 37 illegal non-equipped solid waste disposal sites registered in the coastal zone:

- Develop recovery plans based on the previously defined priorities and define the dynamics for their implementation;
- Prepare technical documentation for implementation of the recovery activities;
- Define the manner of segregation of hazardous waste present in the disposed municipal waste and the method for its permanent disposal and/or elimination;
- Until 2017, as a priority engage in recovery of the Cafe site, of particular importance because of the direct harm it causes to the marine environment due to the disposed solid waste on the shore.

**Priority number 9**
**EO5/MW1/M16, EO9/BW1/M2, the abbreviated code: MW8, BW4**

By 2020 eliminate all sewage short outlets, particularly in The Boka Bay, and connect all settlements with more than 2000 inhabitants to WWTPs.

**Priority number 9**
**EO10/SW2/M5, the abbreviated code: SW4**

For the newly constructed illegal neighbourhoods on the Bojana River, introduce the obligation of installing special waste water treatment facilities for homes, and organize collection of solid municipal waste.

**Priority number 9**
**EO9/PO1/M1, EO9/PO1/M2, EO9/PO1/M3, EO9/PO1/M4, EO9/PO1/M5, EO9/PO1/M7 the abbreviated code: PO1**

By 2021 eliminate PCBs usage in Montenegro by enabling:

- Preparation of detailed inventory of all sites contaminated with POPs by 2017;
- Elimination of PCBs from non-operational equipment by the end of 2020;
- Phasing out of equipment containing PCBs by 2020 at the latest;
- Export of disposed PCBs oils and equipment
containing PCBs by 2021;
- Remediation of 50% of sites contaminated with PCBs by 2021.

**Priority number 9**
**EO5/MW1/M21, the abbreviated code: MW9**

Integrate monitoring of surface and ground waters' quality into National Programme for Monitoring of the State of Environment, the implementation of which is the responsibility of the Environmental Protection Agency.

**Priority number 9**
**EO10/SW1/M2, EO10/SW2/M2, the abbreviated code: SW5**

Establish Transboundary Commission for cross-border region of the Bojana River in the framework of cooperation between Montenegro and Albania and provide financial and technical support to its functioning.

**Priority number 9**
**EO10/SW3/M3, the abbreviated code: SW6**

Develop the Plan to reduce the amount of marine litter by 2020 (in relation to achievement of EO10 while implementing EcAp), and that requires monitoring of types and quantities of marine litter, application of indicators for monitoring the implementation of the Plan, database creation and public access to information.

**Priority number 9**
**EO5/MW1/M21; EO5/MW1/M20; EO5=EO9=EO10=Mo=Re/M20;=PP=PAw=PAcc1/M4; EO5/MW1/M21, the abbreviated code: Σ6**

Engage in detailed analysis of national legislation with regard to ELVs stipulated in the national action plans (especially for nationally prescribed ELVs for key nutrients (NO2, NO3, NH4 and PO4) in the sea with levels which are not conducive to eutrophication according to EcAp/IMAP by 2017), identify shortcomings and harmonize regulations where necessary.

**Priority number 9**
**EO9/ID1/M7, the abbreviated code: ID2**

By 2019 prescribe the permitted values for the content of organometallic (Hg, Pb, Sn) compounds in water, sediment and biological material, including the content of the organotin compounds (MMT, DMT, TMT, TeMT, HMT, DBT), especially being aware of their negative effects on shells.

**Priority number 9**
**ΣM20 (EO5=EO9=EO10=Mo=Re/M20=PP=PAw=PAcc1), the abbreviated code: Σ7**

Entrust the responsibility for monitoring of surface and ground waters to the Environmental Protection Agency in order to support efficient environmental protection and to achieve GES (good environmental status) of marine waters.
**Priority number 9**
EO9/PO1/M2, EO9/PO1/M6, the abbreviated code: PO2

Provide continuous monitoring of PCBs in marine environment and control of the PCBs stocks at hot spot locations or at temporary disposal sites as well as the equipment containing PCBs starting from 2017.

**Priority number 10**
EO9/BW1/M1, EO10/SW1/M1, EO9/BW1/M5, EO9/BW1/M8, EO10/SW3/M4, the abbreviated code: SW7, BW5

Preserve cleanliness beaches by enabling for the following:

- Construction of sewage systems along the coastline for agglomerations with more than 2000 inhabitants;
- Sound waste management in accordance with the National Plan for Waste Management until 2021;
- Preparation of beach profiles and bathing water profiles in accordance with “Criteria and Standards for bathing waters quality in the framework of the implementation of Article 7 of the LBS Protocol “ (IG 20/9);
- By 2017, involve municipal enterprises, beach lessees and fishermen in the activities of beach cleaning and record keeping of types and quantities of marine litter on the beaches and in the sea, in order to collect necessary data for the development of the Plan for reduction of marine litter.

**Priority number 10**
EO5/MW1/M22, the abbreviated code: MW10

By 2018 establish continuous control over quality and quantity of wastewater at all discharges into the sea and wastewater treatment plants in order to assess the outflow of nutrients and contaminants into the sea.

**Priority number 10**
EO9/ID2/M6, EO9/ID2/M8, the abbreviated code: ID3

Strengthen the capacities to properly react in the events of accidental pollution in Bijela Shipyard.

**Priority number 10**
EO9/BW1/M5, the abbreviated code: BW6

Implement carrying capacity assessment when planning tourism valorisation of beaches.

**Priority number 10**
EO10/SW1/M6, EO10/SW1/M8, EO10/SW1/M14, EO10/SW2/M6, the abbreviated code: SW8

Use incentives, introduce new economic instruments and apply consistent punitive policy to improve financing of the establishment of a sustainable waste management system.
Priority number 10
ΣM15; Σ:EO5=EO9 =EO10/
MO=Re=PP= PAw= PAcc, the abbreviated code: Σ8

Strengthen implementation of penalties for non-compliance with requirements and conditions defined in issued authorizations and regulations.

Priority number 10
EO10/SW2/M/1, EO10/
SW2/M/2, EO10/SW2/M/3,
EO10/SW2/M/4, the abbreviated code: SW9

Prevent inflow and/or reduce the quantity of marine litter inflow via rivers and main torrent flows into the sea.

Priority number 11
EO10/SW3/M5, the abbreviated code: SW10

Following the adoption of the Plan for reduction of marine litter, ensure adequate support for the development and implementation of the program for solid waste monitoring deposited on the bottom of the sea and implementation of the cleaning campaign, including the development of scientific-research projects to test microplastics in the water and its impact on the marine ecosystem.

Priority number 11
EO10/SW3/M2, the abbreviated code: SW11

Develop and adopt legislation on floating solid waste (marine litter) by 2017.

Priority number 11
AP1/M8, AP1/M9, the abbreviated code: AP2

Amend national legislation in order to:

- Prescribe, by 2020, limitation of vaporizable hydrocarbon emissions during fuel filling and use of vehicles older than 10 years,
- Limit emissions from ships anchored in ports and marinas in accordance with the MARPOL Convention.

Priority number 11
AP1/M10, AP1/M14, the abbreviated code: AP3

Prohibit the burning of PCB oils and waste with PCBs and other hazardous waste and use of PCBs in devices as of 2020.
Priority number 11
AP1/M1, AP1/M4, the abbreviated code: AP4

Improve network of air quality monitoring stations in coastal area as well as air quality modelling.

Priority number 12
AP1/M2, AP1/M3, AP1/M5, AP1/M6, EO10/SW1/M4, the abbreviated code: AP5, SW12

Promote the use of alternative forms of transport, using electricity, solar energy, natural gas, batteries, etc., as well as mobile and emission-responsible, to the extent possible, waste collection system (with regard to air polluting emissions).

Priority number 12
EO9/PO1/M7, EO9/PO1/M7, the abbreviated code: PO3

By 2020 provide funds to export disposed quantities of PCBs oils and equipment with PCBs content.

Priority number 12
AP1/M11, the abbreviated code: AP6

Reduce air pollution by introducing fiscal measures for fuel.

Priority number 13
EO5/MW1/M23, EO5/MW1/M25, the abbreviated code: MW13

Limit the construction of new facilities using septic tanks, while establishing the system of control of the pace of drainage of existing ones, particularly in hotels, resorts and bigger residential and commercial facilities, implemented by the responsible municipal services and inspectorates.

Priority number 13
EO9/ID1/M1, EO9/ID1/M2, the abbreviated code: ID4

Develop and implement capacity building programmes for application of BAT and BEP as to support transfer of cleaner/new environmentally friendly technologies.

Priority number 14
EO10/SW1/M10, EO10/SW1/M11, the abbreviated code: SW13

Promote importance of:

- Behaviour patterns of individuals regarding reduction of waste generation
- Understanding of re-use and recycling of waste and buying products made from recyclable materials
- Sound waste management.
8.2 Selected priority investment projects

Selection of investment projects is based on the results of:

- prioritization and ranking of aggregated measures,
- cost estimate for aggregated measures,
- ranking of priority hot spots and sensitive locations.

With a complete overview of the needs related to application of the above approaches to the selection of priority investment projects, the proposals were made with the aim to support either implementation of technical measures that are financially demanding, or whose implementation needs to begin urgently, especially if there is an obvious adverse pollution impact on the population and environment, particularly at hot spots and sensitive areas.

While proposing the priorities, special attention was paid to the facts that some of these investments might eliminate or mitigate the strongest pressures on the land and marine environment, but also to these investments raising the attractiveness of the Montenegrin coastal area, primarily for the development of tourism and agriculture and rural development.

Out of a total of 8 integrated proposed projects, seven are related to the implementation of technical measures and one to institutional capacity building for the implementation of IMAP/EcAp.

Starting from the cost estimate for aggregated measures, funds provided thus far, if any, and missing funds, the investments proposed are those which have not secured funds from national public sources. However, preparatory technical documents or initial stages of construction were finalised thus far for all proposed investments, except for the projects to introduce IMAP and to regulate marine litter inflow from the rivers Bojana and Sutorina. As this is a very demanding investment with the implementation time frame until 2020 or until 2025, provision of financial support in the upcoming stages is of the utmost importance for achieving the goals of these projects. This primarily applies to projects aimed at building infrastructure for waste water treatment and solid waste management, given that pollution from these sources generates the greatest pressure on marine ecosystem, as also confirmed by the calculation of emission load in the 2013/2015 NBB. Project fiches presented in Annex IX contain detailed information on the project stages implemented thus far and finalised assets, together with data on the sources of both domestic and international funding. The project fiches contain information on activities and resource needs that should be provided in the forthcoming period.

It is important to recall that Montenegro did not participate in any form of technical and investment support for pollution reduction and prevention under the umbrella of the H2020 Initiative and programmes that were designed to support UfM priorities in the Mediterranean region. The same applies to the previous phase of the Mediterranean Hot Spots Investment Programme – Project Preparation and Implementation Facility (MeHSIP-PPIF), which was implemented in the 2009-2014 period and which was aimed at providing support to the Horizon 2020 Investments for Pollution Reduction component. Knowing what a low level of the 2005 NAP’s implementation was achieved until now,
mainly due to insufficient financing, but also being aware that the majority of the 2005 NAP’s measures were related to the infrastructure for wastewater and solid waste treatment, all possible efforts have to be invested to create sustainable technical and financial support for implementation of the 2015 NAP's measures, especially technical and institutional measures and the related investment portfolio. Thus, MeHSIP II Facility should be opened to support Montenegro. Supporting that, a number of the H2020 Steering Committee conclusions were made advocating the need to allow H2020 technical component's implementation in the Western Balkan countries.

The total value of the entire investment programme that is proposed by the 2015 NAP is 170,336,209 €, out of which only 1,720,000 € should be allocated for institutional capacity building for the implementation of IMAP/EcAp. It actually confirms a huge need for investments to provide a healthy marine environment as a precondition for sustainable tourism development and increase in the share of green jobs. All of the proposed projects related to waste water management and solid waste management aggregate a number of individual projects. Each of them can be implemented individually or all of them aggregated into a single programme. The cost estimate has been realistic, since it was based on implementation of previous phases/project components or on on-going activities.

Apart from the technical eligibility, investment portfolio has a number of other advantages. In its capacity of the main implementing institution for the proposed investment portfolio, the Ministry of Sustainable Development and Tourism has a lot of experience in implementing infrastructure projects since this type of action is in the core set of its responsibilities. Furthermore, arrangements with IFIs are the main mechanism providing for implementation of the most important national policies, especially of the State Plan for Waste Management and Master Plan for Wastewater Treatment in the Coastal Area and Municipality of Cetinje. Support that may be granted for the 2015 NAP’s implementation would not put any additional burden on
administration; instead, it would facilitate achievement of the most important national policy objectives in these thematic areas. All of these projects would be subject to co-financing from public sources or may be joined with appropriate loan borrowing, since both of these are regular mechanisms already used across Montenegro for the construction of municipal infrastructure. As already noted, each of proposed investment projects is partially implemented or is in the process of preparing its implementation. That actually indicates to availability of valid project documentation or relevant input documentation for the development of relevant project documents.

It is especially important to ensure that the experience gained during implementation of technical investment projects, and especially institutional projects, may be replicated across the Mediterranean region. While proposing the investment portfolio, special importance is paid to transboundary project for the Bojana River area, due to a high importance it has for both countries, but also due to impacts generated to the marine ecosystem. Thus, it is highly important to invest all possible efforts to support this set of project actions. At the same time, it is important to note that the institutional project related to IMAP implementation in Montenegro has been proposed due to a significant lack of relevant administrative and financial sources at national level. IMAP implementation is one of the most important preconditions for NAP's implementation. A number of indicators proposed to follow up NAP's implementation are EcAp based indicators which cannot be applied if IMAP is not implemented at the latest in 2018.

Detailed description of the project proposals is presented in the project fiches attached as Annex IX to this document, while they are listed below:

- Remediation of the polluted sediments in Shipyard Bijela, estimated project value up to 2,000,000 €;
- Improvement of the sewage system and construction of waste water treatment in Municipality of Ulcinj and remediation the Port Milena channel and it’s connection to the Bojana River, estimated project value 86,266,209 €;
- Improvement of the sewage network and waste water treatment in Municipality of Bar, estimated project value 34,370,000 €;
- Introduction of the Integrated Monitoring and Assessment Programme (IMAP) on marine ecosystem of the coastal area of Montenegro in accordance with Barcelona Convention requirements, estimated project value up to 1,720,000 €.
- Improvement of the sewage network and waste water treatment in Municipality of Herceg Novi, estimated project value 12,000,000 €;
- Improvement of the sewage network and waste water treatment in Municipality of Kotor and Municipality of Tivat, estimated project value 13,000,000 €;
- Control of marine litter inflow via rivers Bojana and Sutorina into the sea, estimated project value up to 1,000,000 €;
- Development of the project documentation and remediation of 37 illegal non-equipped solid waste disposal sites in coastal area, estimated project value 19,980,000 €;
Monitoring plan for NAP implementation
9. Monitoring plan for NAP implementation

Progress monitoring through indicators is an indispensable element in implementation of public policies (strategies, plans, and programmes). This is particularly relevant for implementation of public policies significant for the management of processes in the coastal zone, primarily for the follow up and evaluation of results and outcomes. Monitoring records changes resulting from a strategy or plan’s implementation, including both the planned-expected and the unplanned ones which can pose a problem. Successful implementation of a policy or an action plan is thus measured for two reasons: 1) to assess progress in implementing the set goals, measures, and actions; and 2) to enable comparability of the state and trends both in the national and international context. Based on the progress achieved, it is possible to perform periodic adjustments of monitored NAP’s operational targets and measures.

Selection of indicators is of crucial importance for a successful assessment of effectiveness of measures and policies that are proposed in the 2015 NAP. For this reason, the following approach has been applied in choosing NAP indicators:

- Indicators for the 2015 NAP implementation have been proposed despite the existing limitations stemming from the still evident weaknesses in collecting and processing data in almost all areas relevant for marine environment monitoring. It is expected that progress will be achieved by improving the marine environment monitoring system, especially by introducing IMAP programme in Montenegro;
- Indicators that are already monitored within the marine ecosystem monitoring programme as a segment of monitoring the state of environment in Montenegro and MEDPOL implementation in Montenegro;
- Indicators that enable monitoring of the process of NAP implementation such as process, impact or outcome (or state) indicators were also taken into account. However, process indicators are prevalent due to limitations in quantitative presentation of statistical data on impacts and outcomes, and the long-term character of defined aggregated measures.

The first group of indicators is based on EcAp indicators that have been developed and proposed by UNEP/MAP to effectuate NAP measures implementation in line with legal obligations of SAP/MED and Regional Plans. These groups of indicators should respond to questions related to pollution reduction and prevention trends in the Montenegrin coastal area and coastal environment (to achieve the relevant EcAp GES targets) through the implementation of the LBS Protocol, its Regional Plans, Dumping and the Hazardous Waste Protocols to the Barcelona Convention. However, it should be noted that their application is not possible before introducing IMAP in 2018/2019, thus creating data sets and monitoring system to support their application. Being such, this group should be taken with precaution since IMAP introduction and implementation requires significant technical and financial support.

Two more groups of indicators are part of the current national marine environment monitoring programme and consequently applied in the scope of monitoring NAP implementation.
Fact sheet G contains the above listed group of indicators for each aggregated measure. The list of indicators for assessing the LBS, Dumping, Hazardous Waste Protocols, NAP and Regional Plans implementation is based on the formulation and coding of indicators that is proposed in the document UNEP(DEPI)/MED WG.404/7 for each of aggregated measures with regard to the following group of requirements:

- Urban development
  - Wastewater treatment
  - Bathing water quality
  - Municipal solid waste and marine litter
  - Urban air quality

- Industrial development
  - Industrial pollution
  - Hot spots
  - Dumping
  - Hazardous Waste

Moreover, when deemed appropriate, indicators of national relevance are defined.

The progress report should be prepared by applying the main indicators proposed in Fact Sheet G attached to NAP as Annex VIII. Ministry of Sustainable Development and Tourism’s Department for Sustainable Development and ICZM, as the national authority responsible for cooperation with UNEP/MAP, and Environmental Protection Agency, as the institution responsible for MEDPOL implementation under supervision of this Ministry, will be responsible for monitoring and reporting on the progress in NAP’s implementation.
Capacity building plan for NAP`s implementation, education and public awareness raising
10. Capacity building plan for NAP’s implementation, education and public awareness raising

Available human resources – knowledge, skills and social capital – represent one of the most significant development factors. Human resources cannot be strengthened in a good way without appropriate organizational restructuring and capacity building within public administration institutions. Accordingly, improvements of the pollution prevention and control system are not possible without simultaneously investing into development of capacities of civil servants and experts to perform the assigned tasks efficiently and effectively. That is why the 2015 NAP measures are pertinent to human resources strengthening, improvement of knowledge, public participation and awareness raising. They may be grouped into 2 main categorizes:

- building capacities and improvement of knowledge, and
- increasing awareness on the need to prevent and/or reduce pollution impacts on human health and marine ecosystem health.

Due to the importance of targeted knowledge upgrading, capacity increasing and awareness raising activities, specific measures are identified in the 2015 NAP as follows:

- Application of BET in Shipyard’s technological process;
- Application of BET for remediation and green infrastructure treatment of solid waste generated in WWTF;
- Application of new technologies, BET and green infrastructure in the practice of solid waste management;
- Improvement of knowledge and practice transfer and implementation of MSFD and EcAp, especially with regard to application of new standards and methods for IMAP, as well as knowledge on the WFD;
- Improvement of knowledge on BET related to PCBs;
- Improvement of knowledge and capacities of relevance for marine litter management and monitoring;
- Increase knowledge on re-use of treated water;
- Increase knowledge and awareness on behaviour patterns of individuals regarding reduction of waste generation (understanding of re-use and recycling of waste and buying products made from recyclable materials; sound waste management);
- Improvement of knowledge on beach management;
- Improvement of knowledge on CCA tools;
- Improvement of knowledge on economic instruments, including introduction of fiscal measures for fuel;
- Improvement of knowledge on air modelling;
- Improvement of data management and application of regular monitoring mechanisms;
- Increase awareness on the marine ecosystem sensitivity in the Bay of Kotor;
- Increase awareness on the Bojana River and adjacent coastal area’s sensitivity;
- Increase knowledge and awareness on the use of alternative forms of transport, using...
electricity, solar energy, natural gas, batteries, etc., as well as mobile and emission-responsible, to the extent possible, waste collection system (with regard to air polluting);
- Implementation of capacity building component of Integrated Management Plan of the Bojana transboundary area;
- Implementation of training programmes to boost inspection control and preparedness and prevention in Shipyard and at the sea.

The 2015 NAP cannot be implemented without a satisfactory level of development of human resources and upgrade of the data collection process and information system management in accordance with the emerging needs and improved regulations. Given that introduction of IMAP is the key priority in the next 3 years, it is necessary to define the structure and contents of databases and gradually upgrade the system for monitoring and reporting on the state of marine environment. Data collection process should be set up systematically in a way that provides for comparable time series on important parameters of the state of the environment, coastal processes, natural and anthropogenic hazards. It is necessary to ensure continuity and gradual expansion of contents of the state of the marine environment monitoring programmes, as well as to provide training on the use of relevant standards and methods related to IMAP’s implementation and modern approaches in reporting on the state of marine environment.

The system of specific EcAp indicators on the state of marine environment should be established, starting from the information available in the framework of the existing databases. It is especially important to improve the reporting system through strengthened support for applying indicator-based monitoring of the state of marine environment, mathematical modelling and the like. It is also necessary to ensure that public interest is protected when performing activities of relevance for availability of the information on state of the environment.

Participation of all the stakeholders and in particular of the expert community is necessary in public debates and planning processes. This enables decision-making and/or correction of the way of work based on reliable and expert information, and adoption of decisions that meet the broadest public interests to the greatest possible extent. International cooperation and exchange of information can make significant contribution to that end.

It is necessary to provide information to the interested public in a timely manner and to improve possibilities for the public to give opinions and make objections, thus influencing the work of public administration in the early stages of the process of creation, adoption and implementation of regulations, implementation of relevant programmes and projects created to support NAP’s implementation.
Capacity building plan for NAP`s implementation, education and public awareness raising