REGIONAL ASSESSMENT ON URBAN STORM WATER MANAGEMENT FINDINGS AND RECOMMENDATIONS

Peer to Peer Exchange on Water Harvesting and Natural Water Retention Measures
THEME 2: ENVIRONMENTAL IMPACTS OF WH AND NWRMS IN URBAN AREAS.

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Legal Mandate for developing the Regional Plan on Stormwater Management

- In 2017, during the MED POL Focal Points Meeting held in Rome, Italy, a "list of potential new/updated measures" was reviewed. A priority clustering of these measures under six potential categories was approved. These included urban storm water.
- In 2019, COP21 adopted Decision IG.24/10 which endorsed the main elements and timeline for six new/updated Regional Plans including Stormwater Management.
- During the 2020-2021 biennium, the Secretariat undertook an assessment of the state of urban stormwater management in the Mediterranean with a focus on storm water management plans; collection systems. Sustainable design, ICZM plans, and maintenance of urban storm water networks in the Mediterranean.
- In 2021, COP 22 adopted UNEP/MAP's Medium-Term Strategy 2022-2027. The MTS Strategy stipulates in Outcome 1.2 the focus on measures dealing with land-based pollution including negotiating and adopting new/updated legally binding Regional Plans containing measures and timetables for their implementation in a number of sectors including "Stormwater." COP 22 also adopted Decision IG.25/19 which mandated MED POL to develop new regulatory measures in line with Article 15 of the LBS Protocol for priority sectors as provided for in the Decision IG.24/10, including "Stormwater."

- To present UNEP/MAP's findings of the regional assessment on Urban storm water management with the aim of developing recommendations for improving stormwater quality and biodiversity.
- Regions include northwest Mediterranean, northeast Mediterranean and eastern and southern Mediterranean.

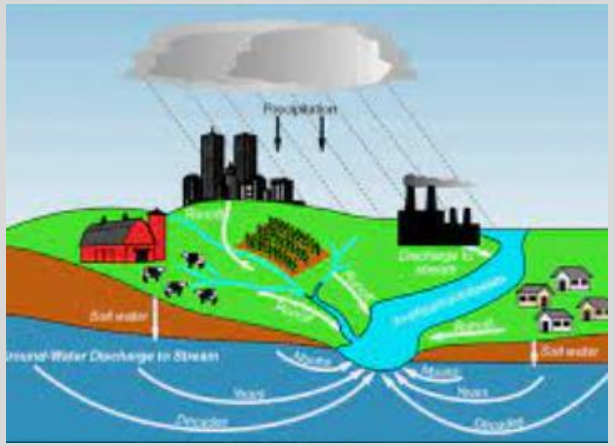
- Scope of assessment follows main elements identified by the countries for consideration in the future Regional Plan on Stormwater Management:
  - availability of storm water management plans,
  - establishment of separate collection systems for surface water run-off,
  - promoting sustainable urban drainage systems,
  - incorporating management schemes of storm water into ICZM, and
  - maintenance of storm water systems.

- Methodology of assessment based in part on a survey questionnaire developed specifically for that purpose; videoconference meetings arranged with responsible agencies, as well as to an in-depth review of existing documents and country reports.

- Questionnaire were distributed to Countries participating in the EU-funded Water-Environments-Support in the ENI Southern Neighborhood Region (WES) Project.

I. Stormwater management plans

- Stormwater management plans address how urban storm water quantity and quality should be managed to protect ecological, social/cultural and economic values.
- Urban storm water management plans are used to assist decision making to ensure that:
  - remedial measures (structural and non-structural) in existing developed areas are undertaken in a cost-effective, integrated and coordinated manner, and
  - decisions in relation to areas of new expansion (including redevelopment) are made with the implications for storm water impacts taken into account in order to achieve the quality goals for water bodies.
- Urban storm water management plans include:
  - risk management (storm water quantity, quality, public health/safety, environmental impacts, etc.)
  - information on location of land-based activities.
- These plans are typically prepared for a local government area, or a catchment area (occasionally for high priority sub-catchment area), and sometimes for a larger territory such as a regional government area.

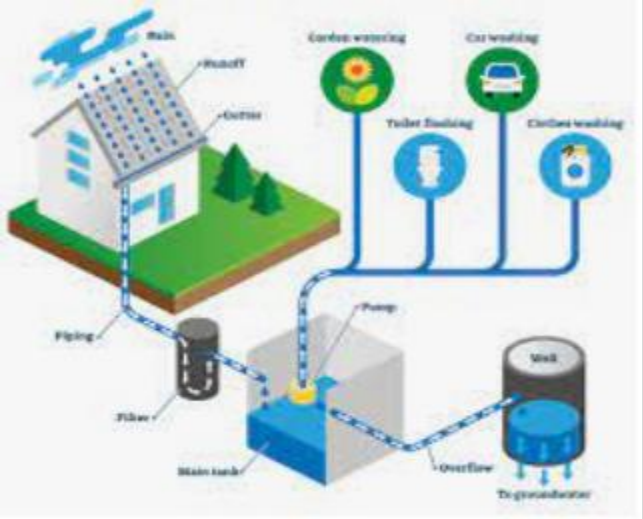


I. Findings on availability of stormwater management plans

- **Northwestern Mediterranean Countries**
  - Urban stormwater management plans have been developed to a significant extent in southwest Europe for major cities (e.g. Barcelona) and to a less extent for smaller municipalities (e.g., Emilia-Romagna in Italy).
- **Northeastern Mediterranean Countries**
  - USWM plans are non-existent or at best under preparation (e.g., in Slovenia, Croatia, Montenegro and Albania). At best, it is found that some elements of the USWM plans are incorporated into Urban Plans but only to a limited extent, such as collection system layout; principles and recommended techniques regarding flood and pollution control management, as well as principles on how to achieve environmental water quality goals for water bodies.
- **Eastern and Southern Mediterranean Countries**
  - USWM plans are under development in some countries and mainly for major cities (e.g., Israel, Palestine, Turkey, Egypt and Tunisia), while in others, they are non-existent. However, these USWM Plans mostly include only flooding control segments, i.e., no pollution control, while segments on risk management and information on location of land-based activities are covered only on a basic level.

II. Separate Collection Systems

- A separate stormwater sewer system is a collection of structures, including retention basins, ditches, roadside inlets and underground pipes, designed to gather storm water from built-up areas and discharge it, with or without treatment, into local water bodies, e.g., streams, rivers, coastal waters.
- Separate collection prevents the overflow of sewer systems and treatment stations during rainy periods and the mixing of the relatively little polluted surface run-off with chemical and microbial pollutants from municipal wastewater.
- Separate storm water systems allow for design of sewers and treatment plants that consider the volume of the wastewater only, while surface run-off and rainwater can be reused after a simplified treatment (e.g. for landscaping or agriculture).



II. Findings on Separate Collection Systems

- **Northwestern Mediterranean Countries**
  - Most major urban centres have both, the combined collection system in city centres and old districts, and separate collection systems in new or recently re-developed districts. Separate collection systems for newly (re-)developed areas, as a desired or prescribed option, have been applied in France since 1970s while in Italy and Spain in 1990s and 2000s, respectively.
  - Separate collection systems are typically implemented in different land-use areas, i.e., urban, industrial and commercial areas Storm water treatment measures in separate collection systems, if applied, are generally limited to screening, detention basins and sand filters, oil separation or alternatively absorption type of devices like biofilters.
- **Northeastern Mediterranean Countries**
  - Storm water collection systems have combined collection systems in older parts of the cities and separate collection systems in areas of new development. Separate collection systems for newly (re-)developed area, has been applied in Greece, while in the rest of the countries, separate systems are very limited in extent and has been implemented only in recent periods, e.g., Slovenia, Croatia. Separate collection systems are commonly implemented in industrial and commercial areas.
  - Storm water treatment processes for separate drainage systems, if applied, are generally limited to simple screening of debris or removal of coarse particles through dynamic settling devices such as cyclone type grit separators. Where space permits, detention basins and sand filters have been used to treat the "first flush" run-off that generally contains higher concentrations of contaminants. Oil separators or alternatively absorption type devices such as activated carbon or compost leaf filters have also been used, mostly in industrial areas, to remove hydrocarbons or other organic contaminants.

II. Findings on Separate Collection Systems

- **Eastern and Southern Mediterranean Countries**
  - Coastal cities typically have infrastructure that is mainly composed of a combined sewer system, that collects both wastewater and storm water from domestic, commercial and industrial areas; although there are some sections of urban areas, typically recently developed, which have separate sewer systems.
  - In addition, there are some segments of the low-income neighbourhoods where sewer systems are inadequate or non-existent, e.g. Tunisia, Egypt, Turkey.
  - There are even some illegal cross-connections whereby untreated wastewater reaches the storm water system and consequently water bodies, e.g. Turkey.
  - However, storm water treatment processes within separate collection systems are commonly not implemented and storm water is discharged untreated.
  - The exception to the above-presented situation in the region, are the coastal cities in Israel which feature separate collection systems due to requirements within the national legislative framework. In these cities, discharge from separate collection systems is commonly used for aquifer recharge, typically via injection to groundwater level with prior implementation of treatment measures, e.g., facilities for removal of sediments (TSS).

III. Sustainable Urban Drainage Systems (SUDS)

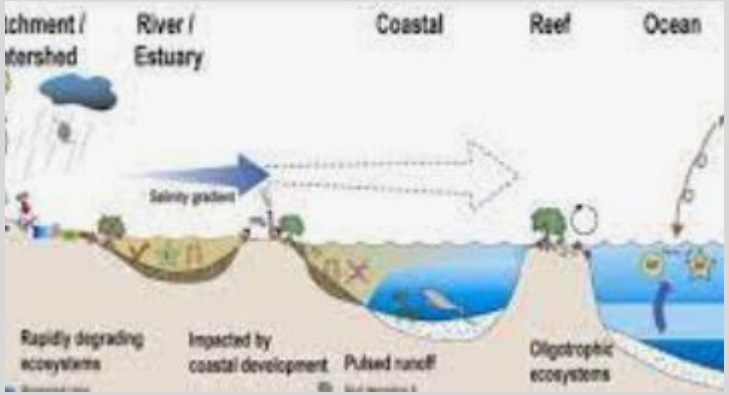
- There is an emerging consensus that urban storm water runoff should be managed via alternative control measures, typically referred as SUDS, which are designed to mimic the natural functions of pre-development hydrology.
- These sustainable storm water solutions aim to minimize the impervious cover by promoting infiltration, ponding and harvesting of storm water runoff.
- Furthermore, in this decentralized management approach, storm water runoff and pollution are primarily controlled by measures located near the source to strive towards well-integrated measures that perform multiple functions, including flood protection, pollution removal and groundwater recharge, as well as recreation, biodiversity and urban aesthetics.

III. Findings on Sustainable Urban Drainage Systems (SUDS)

- **Northwestern Mediterranean Countries**
  - Countries have achieved a high level of awareness; however, despite many arguments in favour, it has not been widely adopted by cities yet.
  - SUDS solutions usually complement traditional (piped) sewerage networks.
  - SUDS approach initially received attention in 1970s, most notably in France, when it has been piloted in small-scale public projects, while from 2000 onwards, it is becoming increasingly convenient to adopt decentralised, small-scale SUDS solutions for drainage of storm water.
- **Northeastern Mediterranean Countries**
  - SUDS has achieved moderate to high level of awareness in both, designers and planners, implementation in practice; however, it is still very rare and typically limited to small-scale public projects, e.g., Croatia, Slovenia, Montenegro, Greece.
- **Eastern and Southern Mediterranean Countries**
  - The concept of SUDS has achieved various levels of awareness and implementation in practice, from a high level in Israel where aquifer recharging and rainwater harvesting is particularly a popular storm water management practice, over moderate or low levels in Egypt, Lebanon and Turkey where pioneering small-scale projects or just pilot case studies are implemented, to lastly practically insignificant levels both in awareness and implementation in other countries, e.g. Algeria.

IV. Incorporating management schemes of storm water into ICZM

- Integrated Coastal Zone Management (ICZM) is a resource management system following an integrative, holistic approach and an interactive planning process in addressing the complex management issues in the coastal area.
- ICZM plans commonly incorporate USWM schemes, which typically promote sustainable management practices such as:
  - pollution control at the product level;
  - separation of waste streams at source, for different land-use areas, i.e. industrial areas;
  - internal recycling and pre-treatment prior connection to public (combined) collection systems;
  - reuse and recycling of stormwater (e.g. rom roofs); and
  - protection of storm water runoff damage due via improved flood control:



IV. Findings on incorporating management schemes of storm water into ICZM

- The ICZM Protocol under the Barcelona Convention has been developed and adopted in 2008 by ten countries and the EU in the Mediterranean basin.
- One of UNEP MAP's Regional Activity Centres (PAP/RAC) has been established in order to encourage the adoption of ICZM Protocol within national legislative framework, and additionally to ensure the implementation of key aspects of the ICZM Protocol by establishing the Coastal Area Management Programme (CAMP) in all Mediterranean Countries going back to the early 1990s.
- Storm water management represent one of the key aspects of the ICZM, and thus USWM schemes are typically integrated into ICZM plans
- ICZM plans have been developed in 2010s in pilot coastal areas in some countries within southeast Europe (e.g. Croatia 2015, Montenegro 2014, Albania 2014) and over 1990s and the 2000s in eastern and southern Mediterranean countries (e.g. Lebanon 2004, Turkey 1994), with support of UNEP-MAP. Yet, these plans rarely included more than basic principles on USWM .

V. Maintenance of stormwater systems

- Proper maintenance of stormwater collection systems aims at keeping storm water networks and infrastructure clean and fully functioning for discharge of storm water, which ensures prevention of flooding or pollution due to malfunction or a storm water overflows during rainfall.
- Ensuring regular and pro-active cleaning and maintenance service of urban stormwater structures is a prerequisite for sustaining the efficiency of the USW systems and preventing the occurrence of floods and pollution associated to malfunction of the system during intense rain events.
- Hence, these services should minimally include road maintenance, street sweeping, storm-drain maintenance, storm water hotline response, and landscape and park maintenance.
- In addition, a performance monitoring, i.e., continuous, flow-weighted sampling methods which require flow and water quality data, should be implemented at key USW structures .

V. Findings on Maintenance of stormwater systems

- **Northwestern Mediterranean Countries**
  - An adequate maintenance is commonly implemented, i.e. actions are performed on a regular basis, and in a pro-active fashion, with only occasional oversights in some of areas – typically small municipalities.
  - Improvement is still needed in certain areas, e.g. cleaning and small maintenance interventions of the drains.
- **Northeastern Mediterranean Countries**
  - Adequate maintenance is typically implemented to some extent, i.e., actions are frequently taken irregularly, and reactively rather than pro-actively, while some of small local communities (e.g. Slovenia, Croatia) do not have enough skilled professional staff to stimulate efficient operation of water-related utilities.
- **Eastern and Southern Mediterranean Countries**
  - Adequate maintenance is implemented only in Israel, while in other countries storm water systems typically suffer from poor maintenance, i.e. service is irregular, inadequate and insufficient, leading to frequent malfunctioning of the sewer networks, as well as intermittent operation of WWTPs (e.g. Palestine, Lebanon, Egypt).
  - In addition, in some countries various forms of malpractice occur frequently in combined collection system, e.g. sewers from combined collection system are bypassing WWTPs, illegal cross-connections are constructed so that untreated wastewater reaches the storm water system, with various misconducts leading to blockages and sometimes even collapse of the conduits.

Thank you

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