Project: Sustainable Hydro Assessments and Groundwater Recharge Projects
Project acronym: SHARP

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APPENDIX: Long version of good practices to be adapted report

GPA 13	Techniques to save water quantity

Involved Project Partners:
Local Councils' Association (LCA)
Saxon State Office for the Environment, Agriculture and Geology (LfULG)
Region of North Aegean (RNA)

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1. Concise description of the adapted good practice

Engaging in several techniques to save water quantity is vital to the success of the SHARP project. The available water resources of the countries represented by their project partner differ from one another. Particularly, Malta being densely populated but poorly endowed with freshwater resources has to meet a high and rapidly increasing demand for water while protecting and conserving the available resource. On the other hand, Germany is a country rich in water resources with the available water supply estimated at 188 billion m3(UBA 2010[1]). However, although the overall water supply is adequate, some regions have limited volumes of water supply.

The problem of Germany where some regions have limited volumes of water supply, to meet water demand adequately any time for the various uses, the extraction and distribution systems have been modified. In Saxony there are 23 drinking water reservoirs, 33 water reservoirs used by industries and more than 80 other

[1] UBA 2010: Water Resources in Germany, published by Federal Environment Agency (UBA) 2010 http://umweltdaten.de/publikationen/fpdf-l/3770.pdf

dams (LTV,2007[2]). Most of these dams are linked in a composite system, in order to allow prolonged dry periods to be bridged. The techniques of artificial groundwater recharge (mostly bank filtration) were used to save water quantity at the local level. Regulations and laws also ensure the water quantity (water law, drinking water protection areas). Monitoring of the available water resources is also important to ensure that water consumption does not exceed the water resources. In this case the actual strategies and system have to be modified.

Appropriate measures such as green roofs, different types of stormwater infiltration and rainwater harvesting and their combination can help restore the natural water balance quite closely. It is possible to properly use the retention and cleaning capacities of the soil and to reduce runoff peaks. Methods for decentralised stormwater management are to be recommended and can be transferred to other regions or countries. When using groundwater as one of our most important drinking water resources, it is necessary to do everything to provide compensation for the deficit thus created. Such compensation can be achieved by example the judicious and effective use of decentralised stormwater management methods. This is the only way to guarantee sustainable groundwater management.

Despite the very limited water resources of the Maltese Islands and the significant importance of water to a sustainable future, water has not to date been valued as the precious resource that it is. There are no easy solutions to Malta's water shortage yet the nation requires water security for the future. Apart from surface water runoff, intensive over-abstraction of groundwater resources is a problem which is reducing the volume of freshwater, increasing salinity levels in the mean-sea level aquifers while in other cases severely degrading the aquifers. In some areas around Malta, water flowing from natural springs has diminished as a result of overexploitation of the perched aquifer.

Given that in Malta there are no surface waters that can be exploited economically and that groundwater resources are subject to increasing competition, the need for various techniques to safeguard water quantity is crucial for the integration of water management practices. Amongst the various techniques, borehole metering, increase in water tariffs, public awareness, infrastructural techniques such as dams and reservoirs, could all be used to save water quantity. Project partners engaging and suggesting techniques to stakeholders may be seen as a positive influence in the process of the SHARP Project.

With regards to water quality, all methods and techniques to save water quantity are useless if the water quality is poor. Saving water which is of poor quality does not achieve anything. Moreover, contaminated water leads to disease and can also be fatal to human, flora and fauna. Poor quality water causes damage to machines and distribution systems which can lead to water loss and therefore a reduction in water supply.

By adapting the techniques of green roofs, stormwater infiltration systems, rainwater harvesting, borehole metering, increase in water tariffs, public awareness and infrastructural techniques such as dams and reservoirs, water is safeguarded from being exploited by the public. Furthermore, the techniques encourage water saving measures within households which have to be supported by several educational awareness campaigns to promote the importance on harvesting and the efficient use of water

[2] LTV 2007: Beste Wasserqualität von der Quelle bis zum Wasserhahn; published by Landestalsperrenverwaltung des Freistaates Sachsen (LTV) 2007 http://www.umwelt.sachsen.de/umwelt/wasser/download/LTV_FL_Wasserguete_RZ.pdf

2. Description of adaption process

The following steps are vital to be implemented so as to ensure water availability. The suggested steps include:

- Water awareness

  The first step to success is to instill awareness among the population that water is a precious resource and needs to be conserved. It is important that such awareness is projected in education and politics.

  Local stakeholders should be encouraged to make use of treated sewage effluent for agricultural purposes including irrigation and constructing new reservoirs and dams. Increase awareness amongst the concerned stakeholders through dialogue meetings and information sessions on the importance of using techniques to safeguard water quantity;

- Price of Water

  Legislations should be enforced on boreholes to meter the quantity of water extracted from each borehole and a tariff should be placed on the water pumped from boreholes. Water tariffs should increase but to a reasonable price. Monitoring and frequent spot checks should be conducted to minimize water theft and billing anomalies. Moreover, there should be an increase in control on urban water demand through tariffs.

- Household water saving measures

  In private and public buildings the following methods have been adopted in order to conserve water; stop function for toilet flushing, self-closing water taps, and water saving shower heads, pressure regulators, water-efficient washing machines and dishwasher.

- Rainwater Management

  Rainwater management is also an effective possibility to save drinking water and to release the water distribution and wastewater systems. In the private household rainwater can be used for irrigation and toilet flushing. In the industrial and agricultural sectors water conserving operations and the development of water conserving technologies are required (research assignment). It is also important to maintain the distribution system to prevent any leakages and therefore loss of water.

  Potable water is used for laundry purposes, meals and drinks, washing and showering, dishwashing, and toilets. Using rainwater can help reduce the consumption of drinking water for purposes requiring no drinking water quality. In this case, the rainwater is not conveyed back into the natural water balance, but re-used for household purposes. Nevertheless, this approach has a positive effect on the natural water balance, because less drinking water needs to be supplied and water resources are spared. There are two basic types of rainwater harvesting systems in the household area. One is the exclusive use of collected rainwater for the irrigation of gardens. This solution is easy to implement and moderately expensive. The other type is the collection of rainwater for actual household purposes. Rainwater can be supplied for flushing the toilet or feeding the washing machine.

  Stormwater from the roof is diverted into a storage tank (cistern). The water is cleaned from dirt particles by a filter installed before the storage tank. Once in the underground storage tank, the water is kept in a cool place at subsurface temperatures. The collected rainwater is passed via a suction line into the piping system for household supply. After use, the water is drained into the sewer system. If the stormwater flow exceeds the storage capacity of the cistern, the excessive water is either allowed to overflow into the sewer system or to percolate into the ground.

- Local policies and legislations

  Current local policies and legislations should be amended and updated where necessary to ensure the sustainability of water. Moreover, enforcement through new legislation on boreholes to meter the quantity of water that is extracted from each borehole should be in place. Furthermore, in Chapter 10 of the Laws of Malta - Code of Police Laws it is stated that every house shall also have a cistern in good condition, of a capacity of at least three cubic metres, for every five square metres of the surface of the floor of each room of such house. This law is in force but not being enforced by the competent authority, hence such laws should be enforced as this legal obligation allows every dwelling to collect rainwater to be used by members of the household in their daily chores. Monitor and conduct frequent spot checks to minimize water theft and billing anomalies

- Infrastructural techniques

  Infrastructural techniques should be promoted. These techniques should harness the storm water runoff through better water management infrastructure techniques to be used during the dry months. Moreover, focus should also be on minimizing any water network leakages such as service-pipe leakages through better infrastructural techniques.

The main obstacles in using techniques to save water quantity are the following:

- Lack of public awareness in using techniques to save water quantity.

  This issue can be approached by inviting stakeholders to participate in information meetings, conferences, and onsite sessions on the benefits of using techniques to save water quantity. This may serve as a positive way to increase the interest and awareness of the public on the problem at hand. Hence, by introducing new methods and techniques, water quantity may be safeguarded.

  Moreover, informative documentation to the public should be made available thus stressing the importance of using techniques to save water quantity. This should be done using clear and simple language to make sure this is understood by everyone. Hence, the use of local case studies as examples, illustrations and other visual aids would come in useful.

- Limited water management infrastructure to save water quantity.

  Through the use of strategic assessments, areas that lend themselves for water management infrastructure required to save water quantity could be identified. To date, techniques to safeguard water quantity exist but these require encouragement to be implemented. This should be on the planning and enforcement agenda amongst all project partners to ensure that such techniques are implemented.

- Stakeholders consumption patterns may be difficult to change.

  Public perception is very hard to change, especially when it comes to consumption patterns. This issue can be approached through organized regular meetings with the stakeholders to oversee their current activities and guide them to change their consumption patterns to start using techniques to save water quantity. Public awareness campaigns also ensure that the general public is well informed.

- All techniques and systems are more or less expensive.

  The costs and efforts to provide sufficient water for household, agriculture and industry are enormous. But everybody has the right to be entitled fresh and clean water. At times natural events like drought and floods complicate the conservation of water quantity and the correct operation of the distribution systems. Also since the water demand varies, the system and techniques have to be flexible and there is a requirement to implement the worst case scenarios, which is sometimes hard to realize. In Saxony

everyone pays for the volume of water used (drinking water, irrigation, water for industrial use). However, these fees do not cover the actual costs which arise for water supply.

Nevertheless, the artificial water storage and distribution is a change of natural water balance which also might cause problems in the environment.