INTEGRATED WATER MANAGEMENT SOLUTIONS IN THE LURÍN CATCHMENT, LIMA, PERU

SUPPORTING UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOAL 6

GENERAL RECOMMENDATIONS

The following 20 key recommendations summarize our experiences in the TRUST project. They are addressed to actors involved in water management in prosperous water scarce regions all over Latin America and the world. We are convinced that actors from authorities and companies, from civil society organizations, NGOs as well as from international development organizations and (applied) research can benefit from these in order to achieve SDG 6.

UNDERSTANDING AND PROTECTING WATER RESOURCES (SDG 6.3 AND 6.6)

1. **Generate a comprehensive and reliable database** for informed decision making of relevant stakeholders. A combined approach of natural science and social science for data collection is helpful, especially in regions where no or little reliable data are available. Check the plausibility of publicly available data sets by triangulation with own on-site surveys and with assessments of the local population.
2. Operate and continuously **maintain monitoring stations** for rainfall and discharge to enable quantification of available water resources. Carefully chose the location of new stations in regions of particular interest, for example to monitor water resources in representative locations, or to support planned measures. Then coordinate between all actors involved in hydrometeorological monitoring design and operation of the measurement network.
3. Implement a continuous **water quality monitoring** program for physical-chemical and microbiological parameters: For laboratory analyses, qualified sampling and analysis procedures are essential. In addition, provide local actors with analysis equipment and enable them to perform basic water analysis, like, e.g., assessing fecal indicator bacteria. Provide technical and methodological capacity building to both, central laboratories and local actors.
4. Support the assessment of land use and water quality by **remote sensing techniques**. Conventional field methods on the ground, however, are still necessary to enable use of the data for in-depth analysis, e.g., for risk assessments using Water Safety Plans.
5. Raise **awareness for water resource protection** and health risks associated with water quality. Communicate monitoring results transparently – and go beyond mere information by implementing an active dialogue and participatory processes with the local population. This provides the base to a successful implementation of risk reduction measures.

TRANSFORMING CONFLICTS THROUGH JOINT WATER USE PLANNING (SDG 6.5)

6. Implement joint water use planning to **prevent and to solve conflicts** between objectives of different water users and between their policies. Joint water use planning needs communication, exchange and cooperation of actors from all sectors and scales, especially between actors of rural and urban areas as well as between upstream and downstream riparian. Towards this aim, various water user groups throughout a catchment need to meet regularly and to jointly develop and implement integrated water use strategies. This could strengthen traditional forms of water governance, as rural self-administration, by embedding them into broader networks and empower new forms of water governance as e.g., catchment wide water councils.
7. **Coordinate the diverse actors** from the entire catchment area to ensure the optimal technical design, social acceptance, and least environmental impact of water policies. This holds true especially when implementing measures to retain and stabilize the water flow of rivers.

TAILORING WATER MANAGEMENT SOLUTIONS LOCALLY (SDG 6.1, 6.2 AND 6.B)

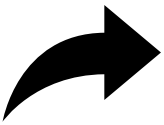
8. **Improve water and sanitation services, and the access to them.** Maintain these improved services through a combination of financial, technical, political, and social support. Develop appropriate operator models and financing instruments to achieve SDGs in rural areas. Therefore, empower communal self-organizations through technical and financial support by the state as well as through information and capacity building. In addition, where tariff-based financing of water services is limited, e.g., due to a high poverty rate, implement other solutions to finance operations and to generate incentives for saving water.
9. In rural and urban areas, consider **integrated solutions** for drinking water supply, wastewater treatment, sewage sludge disposal, safe wastewater reuse and hygiene.
10. **Adapt design, operation and maintenance** of drinking water and wastewater treatment plants **to local conditions**.
11. **Develop locally tailored solutions together with local actors**: include local stakeholders, and in particular key actors, in the assessment of concepts for the treatment of drinking water and wastewater, as well as in the planning and implementation of innovative solutions (technical and organizational). Water management concepts cannot succeed without social acceptance, local support and the possibility of adaptation to the local conditions and resources of the respective operator and public authorities.

IMPROVING WASTEWATER TREATMENT AND REUSE (SDG 6.3 AND 6.4)

12. Give more attention to safely treated wastewater from municipal wastewater treatment as an additional water resource in water scarce regions. There is a significant **potential for reuse** of this water as service water for industrial processes or irrigation water in agriculture and green areas.
13. **Treat municipal wastewaters** accordingly for a safe reuse. In addition, legislative frameworks and limit values for the reuse of water should be discussed and, if necessary, adapted.
14. **Transform informal use of untreated wastewater for irrigation in agriculture into formalized reuse of safely treated wastewater**. Direct reuse is already often taking place, although it is doubtful that the water has the required quality for irrigation. Implementing safe reuse for irrigation locally needs to be supported by capacity building und awareness rising. Furthermore, stimulate cooperation between wastewater providers and demanders (farmers, municipalities, industries).
15. **Consider artificial aquifer recharge** to mitigate the depletion of groundwater resources and ensure sustainable groundwater extraction. Sufficiently treated wastewater from municipal wastewater treatment plants could be used for infiltration, e.g., via artificial infiltration basins or directly in the riverbed during the dry season.
16. **Put the issue of safe reuse prominently onto the political agenda** and discuss it in public dialogues. This is essential to address social and cultural acceptability of reuse as well as to prevent (potential or apparent) use conflicts.

PLANNING AND OPERATING WATER AND WASTEWATER FACILITIES (SDG 6.1 AND 6.3)

17. Chose **technologies with low operating costs**. Adapted, nature based and low-tech solutions are required to treat drinking water, especially for communities in the upper catchment areas (e.g., slow sand or multi-stage filtration). Advanced treatment (e.g., membranes) will probably be too expensive and will cause maintenance problems (service management, but also vandalism, etc.). Wastewater treatment plants must be based on a technology that allows constant treatment performance with low operating costs (e.g., using trickling filter technology).
18. Planning and operation of drinking water treatment requires the **analysis of the raw water**, with regard to quality aspects (e.g., presence/absence and dimension of fecal indicators and pathogen, turbidity changes and load) as well as quantity aspects.
19. **Planning and operation of wastewater treatment plants require detailed data**, e.g., incoming wastewater needs to be analyzed not only for COD but also for nutrients such as nitrogen and phosphorus compounds to prevent nutrient deficiencies in the biological treatment stage. Consider special emission sources, e.g., from industrial plants or other commercial activities. Detailed monitoring of wastewater treatment plants at short and regular intervals allows more stable operation and better process control
20. **Pilots and demonstration plants** can play an important role in visualizing and comprehending the successful use and application of treatment technologies and contribute to their acceptance. They can increase the interest and ensure reliable commitment of involved actors which are the basis for successful cooperation. Finally, these plants are useful for gathering design parameters for full-scale plants.



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