Integrating health, urban planning and wetland management

Factsheet 8

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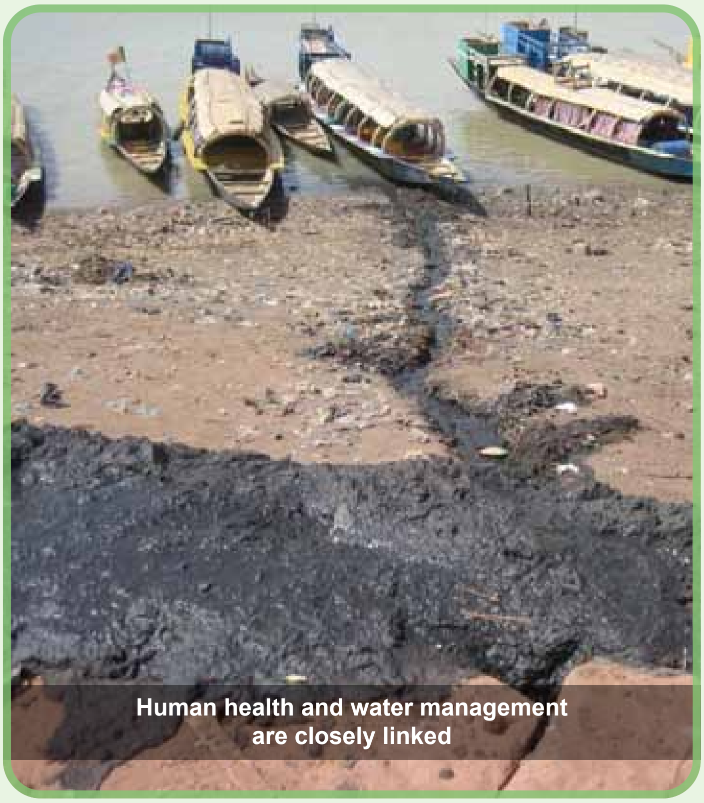
Links between wetlands and health

Livelihood and water-related diseases are strongly linked to wetland management. Top killers among the water-related diseases are malaria and diarrheal sickness. Water resources development (such as dams, reservoirs and irrigation), as well as urban sprawl and ecosystem impairment, have a history of enhancing the risk of water- and vector-borne diseases. Yet, 10% of the global disease burden and 25% of child deaths in developing countries could be prevented by improving water supply, sanitation and hygiene (WASH), and management of water resources. Furthermore, WASH options to prevent transmission of water-related diseases are proven to be effective and often more cost-effective than medical therapy and immunization campaigns.



Human health and water management are closely linked

The relationship between human health and water resources management is particularly strong in wetlands and needs to be nurtured for the well-being of both urban livelihoods and the wetland ecosystem for the following reasons:

- many communities in developing countries use urban wetlands as a natural wastewater treatment plant. The purification capacity of wetlands, however, is limited and, in many cases, already saturated; and
- effective wetland and water resources management can reduce disease transmission;
- wetland dynamics (e.g., annual flooding, presence of stagnant water and the high groundwater table) are important boundary conditions that determine the way of living and direct the management approach that is needed.

Yet, despite the clear links and existing evidence, a methodology to integrate health considerations into wetland and river basin management plans has not previously been proposed. In the WETwin project, a methodology to do so was developed and tested in the data-poor context of the Inner Niger Delta of Mali. In essence, the methodology scores management options against a set of criteria in an iterative, participatory way and allows the comparison of management options. The overall methodology is described in WETwin Factsheets 1 and 3.

Where possible, quantitative data were identified for each indicator, but this was not possible for most indicators in the data-poor conditions of the Inner Niger Delta. Setting these indicators aside, however, would skew the analysis by ignoring important values, simply because they could not be quantified. To avoid this, qualitative indicators scored by combining available information and expert judgment were used where other options are not available.

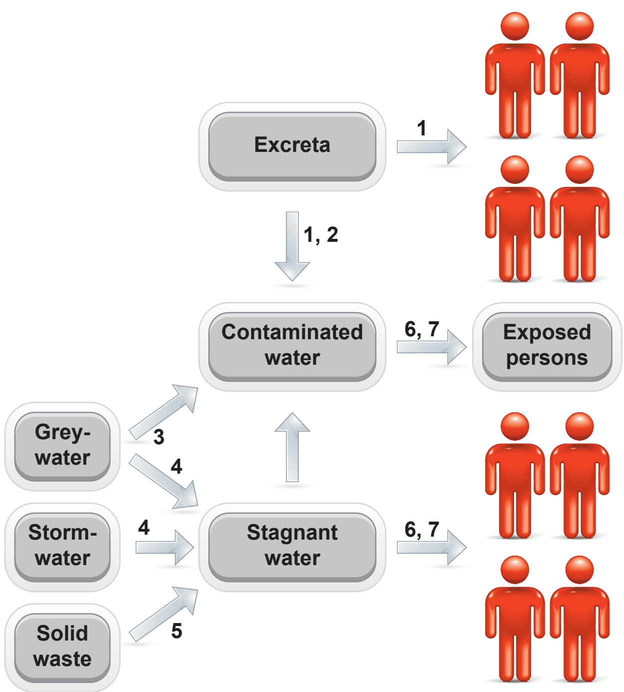
In this factsheet, the following outputs are presented:

- inventory of pathways for disease transmission;
- health impacts of WASH options in urban wetlands; and
- adaptive capacity of the institutional and societal systems.

Common pathways for disease transmission

The high disease burden of tropical and subtropical wetlands is related to the good breeding conditions and habitats for disease vectors (e.g., snails, mosquito larvae) and pathogens, and the high exposure of communities to pathogens and parasites present in excreta, contaminated water and stagnant water. Contact with excreta is caused, first, by open defecation practices (in nature or in the field) and, second, by the unsafe collection and consequent disposal of fecal sludge. Stagnant water is the result of poor drainage facilities. The obstruction of drainage channels by solid waste further exacerbates the importance of stagnant water in disease transmission. Shallow groundwater and surface water are considered unprotected and need treatment prior to use.

The effectiveness of water management to reduce disease prevalence depends on the effectiveness in cutting the pathways for disease transmission (Figure 1), as explained in the next section.



1. Sanitation (improved latrines) 2. Disposal of faecal sludge 3. Water treatment (septic tank) 4. Drainage: a) infiltration pits; b) greywater sewer 5. Disposal of solid waste 6. Safe drinking water (deep wells) 7. Dilution by river flow

Figure 1: Interventions in disease transmission pathways in wetlands

Health impacts in urban wetlands

Improved sanitation and the safe disposal of fecal sludge (Table 1) are the most effective ways of reducing exposure to excreta in the Inner Niger Delta. Less excreta in the wetland, in combination with water treatment (septic tank), helps to avoid water contamination. The exposure to contaminated water can be reduced through access to safe drinking water from an alternative source: protected deep wells. The annual floods dilute the contaminated water and flush the stagnant water.

Numbers as shown on Figure 1	1	2	3	4a	4b	5	6	7
INDICATORS	Improved latrines	Safe disposal of fecal sludge	Water treatment (septic tank)	Infiltration pits	Greywater sewers	Disposal of solid waste	Safe drinking water (deep wells)	Flushed by seasonal flooding
Water contamination (pathogens)								
Rural wetland	++	+	+	-	-	+	0	++
Urban wetland	++	++	++	- -	- -	+	0	++
Streets and household premises	++	++	++	+	+	+	0	0
Stagnant water (breeding grounds for parasites / transmitting organisms)								
Rural wetland	0	0	0	0	+	+	0	++
Urban wetland	0	0	0	0	0	++	0	++
Streets and household premises	+	+	+	+ +	++	++	0	0
Disease prevalence								
Diarrhoeal disease	++	++	++	+	+	+	++	+/-
Malaria	0	0	0	+	+	+	+	+
Schistosomiasis	+	+	+	0	0	0	+	+

Score key: major improvement (++); minor improvement (+); no indirect or unclear impact (0); minor deterioration (-); major deterioration (- -); and not applicable (N/A)

Table 1: Impact of management options on the risk of disease transmission

Improved drainage, by means of infiltration pits, greywater sewers or open drainage canals, reduces the area of stagnant water bodies, but might cause contamination of the shallow groundwater (in the case of infiltration pits) or the urban wetland (greywater sewers) if not treated prior to discharge. The collection of solid waste, as an option to avoid obstruction of open drainage canals, is generally positive for urban water quality, the reduction of stagnant water and decrease of the malaria hazard. Yet, solid waste management is sensitive to the design and timeliness of logistics.

Defining the concept of a wetland's adaptive capacity

Adaptive capacity is still an academic concept, often difficult to grasp, and most definitions of it are not ready for operational use. In order to facilitate uptake of the concept for operational wetland-health management, the WETwin project has put forward a pragmatic definition: "Adaptive capacity is the set of management options that can be taken to adjust a system to environmental change and/or to adsorb a disturbance." Hence, adaptive capacity is an indication of the feasibility of the institutional and organizational system to cope with future changes. The feasibility of a management option is scored from bad to high by means of four criteria: affordability,

organizational capacity, cooperation and robustness to change. The cumulative score of the feasibility scores corresponds to the adaptive capacity. The specific indicators are shown in Figure 2 for the option 'greywater sewers'.

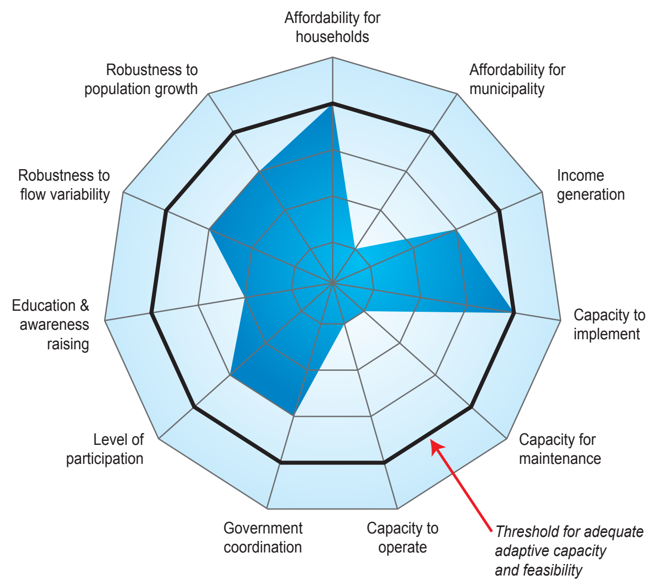


Figure 2: Indicators of adaptive capacity for the management option 'greywater sewers'

For the Inner Niger Delta, the adaptive capacity for improved drinking water is better than for sanitation, mainly as a consequence of the protected deep wells being a source of safe drinking water. The adaptive capacity is acceptable for the household-scale options (improved latrines and infiltration pits), but is unacceptable for public, municipal-scale options such as the greywater sewers and for a system of collection and disposal of fecal sludge and solid waste.

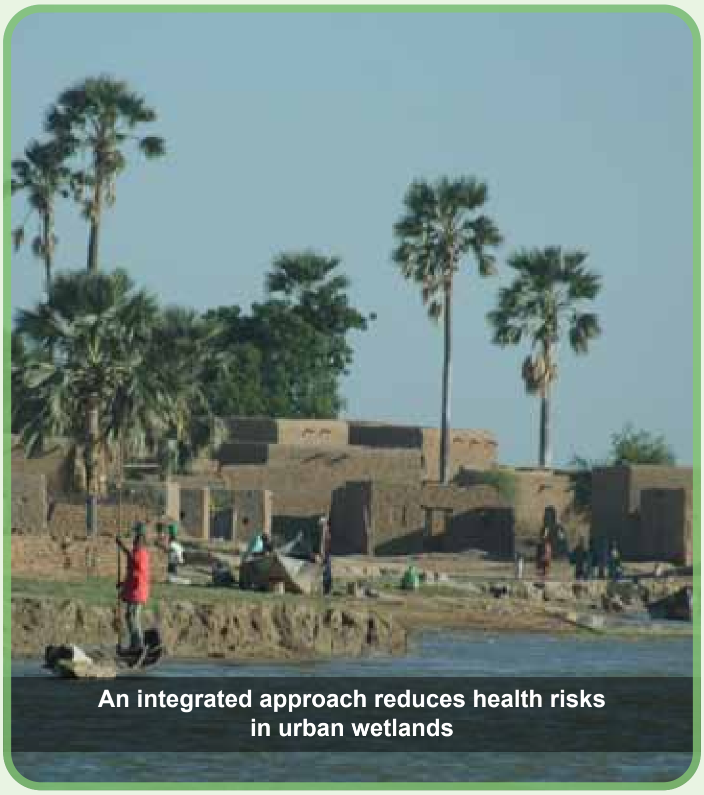
An integrated approach is vital to tackle the challenges in cities

Most existing studies and projects in the developing world have been executed in rural conditions, where the challenge is to provide a safe drinking water supply or to convince villagers to stop open defecation and effectively use latrines (when built) and improve hygiene. Under these conditions, single actions could be justified. For cities located in or along wetlands, an integrated approach is essential to tackle the bigger challenges. These challenges include the following:

- higher population density resulting in large volumes of excreta, wastewater and solid waste;
- limited space available for the safe disposal of wastes; and
- the bigger the scale of a city, the more coordination, better planning, and stronger organizational and technical capacity is required.

An integrated approach is essential in dealing with the multiple pathways for disease transmission in urban wetlands. The nature of the pathways means that access to sanitation is critical. As long as there is at least one person practicing open defecation, human exposure to excreta remains; for example water contaminated with a few cholera pathogens can cause fatal outbreaks of the disease at a large distance away from its source of pollution.

Conclusions and recommendations



An integrated approach reduces health risks in urban wetlands

Target the right pathway to reduce disease transmission

- The effectiveness of water management to reduce health risks depends on the effectiveness in cutting the pathways for disease transmission. The pathways, therefore, need to be identified and assessed first and, consequently, prioritized and targeted.
- If the pathways for chemical and bacterial contamination are not controlled, wetlands may deteriorate resulting in loss of wetland ecosystem services and increased transmission of diseases
- More clarity is needed on the most appropriate options for urban water management and sanitation. The self-purification capacity of urban lagoons is limited and, in many cases, saturated. Centralized systems might be appropriate but this largely depends on local conditions.
- Downstream ecosystems and settlements are mostly affected by upstream pollution sources.

Tools to promote mutual understanding and multi-criteria decision-making

- The importance and appropriateness of management options is often poorly understood, especially by other sectors and stakeholders. The framework presented is useful to promote mutual understanding, to integrate different domains, such as wetland and health management, and to judge the appropriateness of management options in a data-poor context.
- A detailed quantitative assessment is often not needed prior to decision-making. More important is the inclusion of all relevant criteria to assess appropriateness (such as affordability, long-term maintainability, fit within the organizational and institutional capacity, robustness to climate change and the acceptance by stakeholders) rather than limiting the analysis to costs and benefits.

Better cooperation and capacity building

- Effective risk prevention through water management asks for an integrated approach, including both water management, and infrastructural and community options.
- Efforts are required to create awareness amongst households on how to reduce contact with faeces and contaminated water.
- Additional capacities are needed for the collection and disposal system for fecal sludge and/or solid waste.
- Better understanding of the robustness of management options to future change is needed.

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About WETwin

The WETwin project aims to enhance the role of wetlands in integrated water resources management for twinned river basins in the European Union (EU), Africa and South America in support of EU water initiatives. The objective is to improve community service functions while conserving good ecological status.

Partners

VITUKI Environmental and Water Management Research Institute, Hungary (coordinating partner)
Wetlands International, Mali
Antea Group, Belgium
Potsdam Institute for Climate Impact Research, Germany
WasserCluster Lunz, Austria
UNESCO-IHE Institute for Water Education, the Netherlands
National Water and Sewerage Corporation, Uganda
International Water Management Institute, South Africa
Escuela Superior Politécnica del Litoral, Ecuador

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Factsheet topics

1: Lessons learned from a comparative assessment
2: Enhancing governance in wetland management
3: Devising a Decision Support Framework
4: Balancing ecology with human needs in wetlands
5: Creating an effective Spatial Data Infrastructure
6: Wetlands in a catchment context
7: Assessing vulnerability of wetlands to change
8: Integrating health, urban planning and wetland management
9: Case study: Lobau wetland, Austria
10: Case study: Ga-Mampa wetland, South Africa
11: Case study: Abras de Mantequilla wetland, Ecuador
12: Case study: Gemenc floodplain, Hungary

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