Greening EU COOPERATION
Integrating environment & climate change

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Addressing water scarcity and community vulnerability

STORIES OF TRANSFORMATIONAL CHANGE

Inspirational examples highlighting transformations towards greater environmental and climate sustainability

6 CLEAN WATER AND SANITATION

SDG target 6.4:
By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

The challenge of viable livelihoods

40% of the world's land surface is covered by drylands – home to 2.3 billion people, including 74% of the world's poorest people. It is not only in semi-arid regions that is water scarcity a growing concern. Due to changing weather conditions, rainfall is highly erratic and less reliable. During the dry season, in many semi-arid regions surface water sources are insufficient or absent, adding further burden by prolonging walking distances to water sources.

A resilient response is to construct sand dams

A sand dam includes a reinforced concrete wall built across a seasonal sandy river. The idea of this natural storage solution is based on sedimentation of coarse sand upstream of the structure. The sand enlarges the storage capacity of the riverbed aquifer as gravel and coarse sand can store up to 35% of their total volume as water. During the wet season, the aquifer fills with water stemming from surface runoff and groundwater recharge within the catchment. Water can be harvested from hand dug scoop holes in the riverbed or wells constructed on the upstream side. By preventing evaporation or contamination of water sources, a sand dam can store up to 40 million litres of water which is then available for domestic and productive use when needed. And still, each sand dam stores only a small amount of the total water flow – allowing downstream communities their share of water too. The highest concentration of such sand dams can be found in Kenya.

Appropriate technology transforms rural lives in Kenya

More than 550,000 people live in Kitui District in southeast Kenya. Water resources are few and far apart in dry periods so that farmers struggle to secure food production and people have to walk up to twenty kilometres to fetch water. Changing weather and frequent drought aggravate their conditions. In 1995, the local NGO Sahelian Solutions Foundation (SASOL) constructed the first sand dam in Kitui District. Since then, local communities with support of external actors (including the EU) have built 750 sand storage dams bringing water closer to households and

"The natural functions of ground and surface water must be restored."

The European Green Deal[1]

750 sand storage dams

bring water closer to households in Kenya

serving up to several hundred thousand inhabitants. Across the district, the dams provided communities with access to drinking water which was unavailable before. Without the sand, which is good at capturing precipitation, 80% of the precipitation was lost as surface runoff.

A well-designed and constructed sand dam needs zero or minimal maintenance. The biggest challenge in the process is the technical capacity to establish feasibility, select the site, design and construct a sand dam. A challenge during the planning of a dam is the assessment of the ability of a river to transport sediment in case of flooding. Improper construction can lead to sand dams failing to capture sediment or to yield enough water due to filling with silt. Once a dam is in place, it needs to be monitored for leaks, cracks, erosion and changes in river course.

Sand dams decrease the risk of floods and droughts along seasonal rivers.

Sand dams act as a catalyst for further development

Sand dams have multiple benefits. They provide water for domestic use, for livestock and small-scale irrigation, including horticulture, tree nurseries and fruit orchards. Sand dams also increase resilience and the adaptive capacity of local communities. Due to soil and water conservation, communities can establish more sustainable forms of agriculture, establishing seed banks, terracing of the land and diversifying crops. Farmers in Kitui District have increased food production and improved diets, in turn contributing to improved food security. By reducing the amount of time women and children spend fetching water, families have more time to farm with the potential to learn, innovate and improve farming practices. And increased family incomes allow more children to attend schools.

And there are further benefits. Areas with sand dams experience less water related diseases. The sand acts as an effective filter. As the sand prevents mosquito breeding, dams contribute to reducing the threat of malaria. Over the long term, sand dams can transform the local ecology: water captured in the sand behind the dam spreads out horizontally thereby producing a permanent increase in the water table. Acting as a natural buffer, sand dams

[1] European Commission: Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on The European Green Deal, December 2019, COM(2019) 640 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640

decrease the risk of future flooding and drought along the seasonal rivers. And unlike conventional dams, sand dams don't suffer from evaporation.

The use of sand dams has transformed hundreds of communities in water scarce areas. Once living in precarious situations, local populations benefit from better access to water, less disease and more productivity. The flow of rural to urban migration is reduced and, collectively, a network of sand dams throughout a river basin can establish an ecological 'line of defence' against climate variation.

Community engagement for natural storage solution

Both the key to success, but also the challenge, comes from community engagement. End-users are involved in the entire process from project planning, to site selection, building and maintenance. Joint building the sand storage ensures capacity building and the transfer of skills needed for long-term-maintenance after project completion. Community engagement around the construction of dams offers opportunities for raising awareness about better management of water quality and collective risks, such as those relating to sanitation and hygiene.

Drivers for transformation in dry-lands

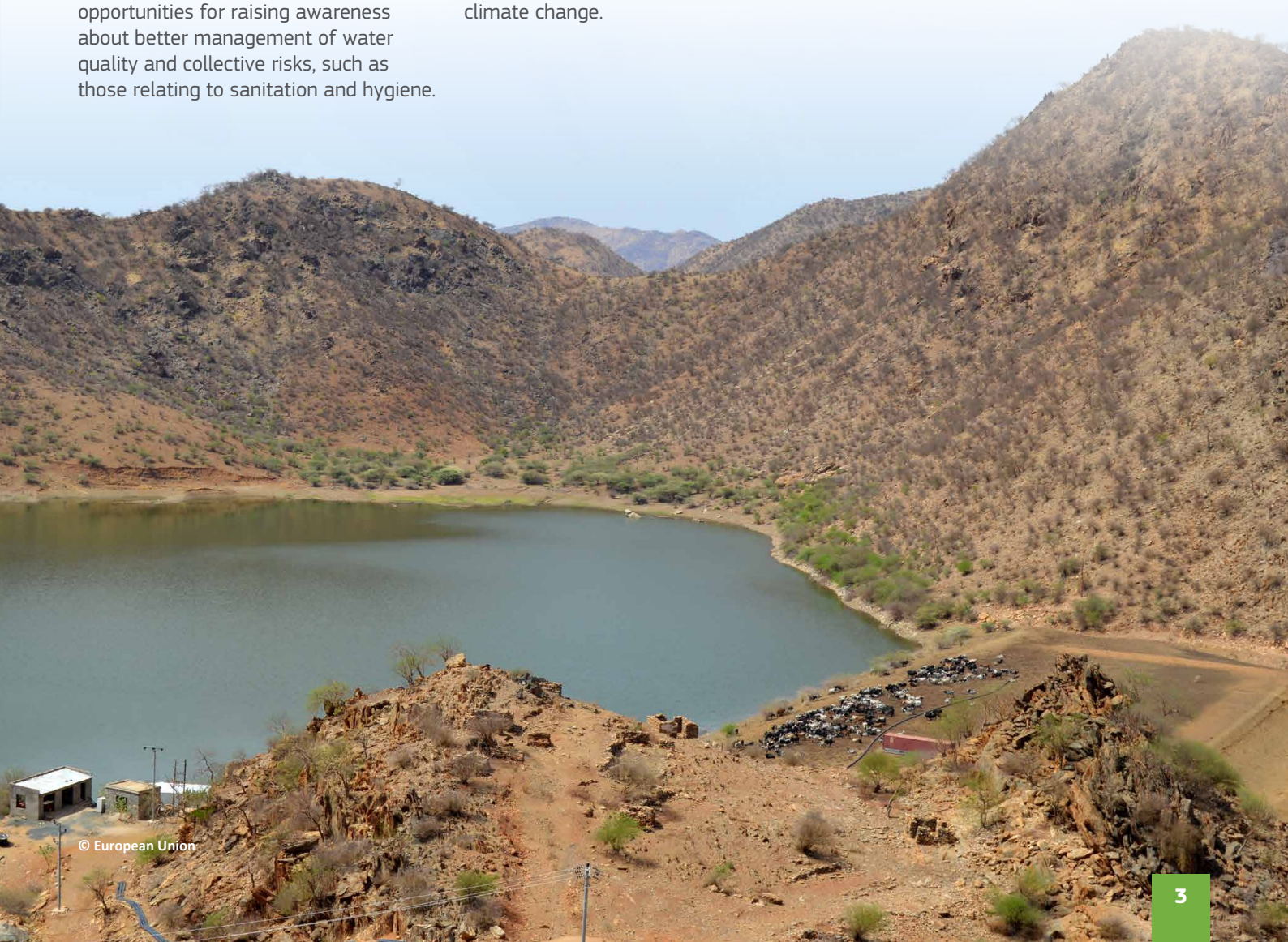
- Sand dams make needed water resources accessible and respond to community needs
- They are a low-cost measure with low investment per capita
- There is community ownership as they are the ones experiencing the benefits

Future potential of sand dams

As inexpensive structures with a high level of community involvement, sand dams offer a simple and cost-effective mitigation measure against risks of drought. Experiences from the world's semi-arid regions, including from Angola, Mozambique, Eswatini, Sudan, Uganda and Zimbabwe, but also from Japan, India, Thailand and Brazil highlight the positive impacts for local communities. Given the low investment per capita - in the right ecological conditions, sand dams have great replication potential. Promoting such subsoil rainwater storage to support dryland agro-ecosystems increases the resilience of local communities to climate change.

Sand dams are a cost-effective climate change adaptation measure that increases community resilience.

40 million litres
of water can be stored in a sand dam



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Environment and climate change mainstreaming is a legal EU requirement, essential to meeting international and internal commitments, and to supporting sustainable development worldwide. The EU is actively doing its part through the European Green Deal and will support partners to do the same.

For advice and training on environment and climate change mainstreaming, contact:

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