

SPATE IRRIGATION IN PRACTICE AND PICTURES



A photo book based on insides and outcomes of the project “New water rights for basin management and inclusivity in spate irrigated areas of Pakistan”.

Part 1

Introduction

Introduction photo book

Spate irrigation is a unique water resource system that makes productive use of short duration floods in dry riverbeds. It is common in Pakistan, covering an area of 1 million hectare. This photo book aims to give an impression of two spate irrigated areas in Pakistan. These areas are located in Sindh and Balochistan and are respectively called Bagh Narri and Nai Gaj. After an introduction of this photo book and the project, some maps and remote sensing images are shown and discussed. Furthermore, some general pictures are shown, followed by pictures on (use of) floodwater and livelihood opportunities. This photo book is built around the working packages from the NeWaRBi (New water rights for basin management and inclusivity in spate irrigated areas of Pakistan) project. This photo book is meant to both inspire and inform the reader about spate irrigation in these areas and the NeWaRBi project.

Introduction project

The NeWaRBi project aims to optimize the current spate systems by revising the water distribution rules in those dry river systems that have benefited from technical interventions in the headworks. It is envisioned that the systems are brought up to date after changes made to main headworks and resource use, thereby optimizing their overall productivity and promoting their inclusivity, especially for the weakest downstream users. In addition, a whole range of improvements – related to crop agronomy, livestock keeping, small mechanization and water storage, based on proven experiences elsewhere in similar water systems (as documented by the Flood Based Livelihoods Network) is being introduced through farmer groups. The project is jointly implemented by SPO (Strengthening Participatory Organisation), RDF (Research Development Foundation) and MetaMeta.

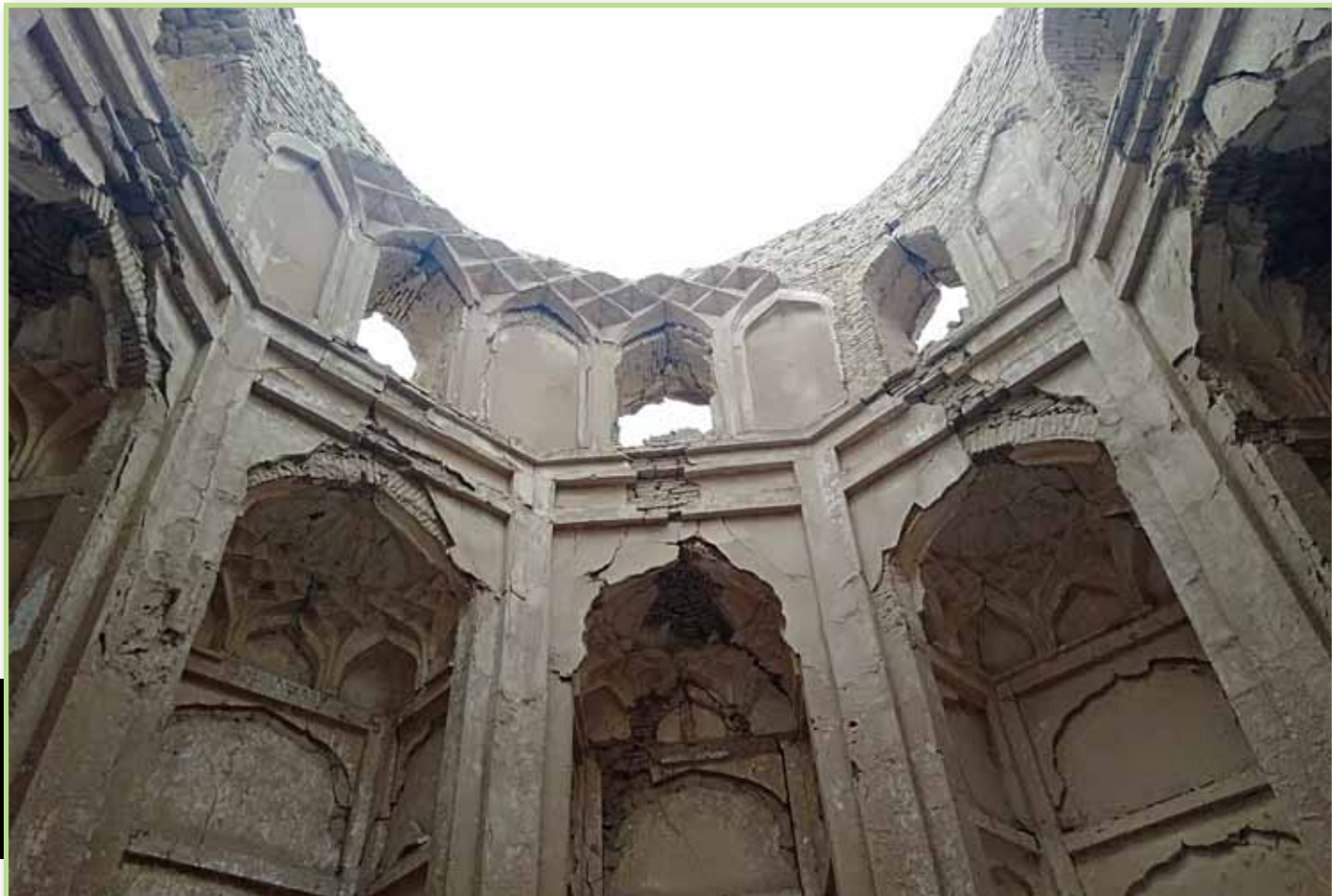


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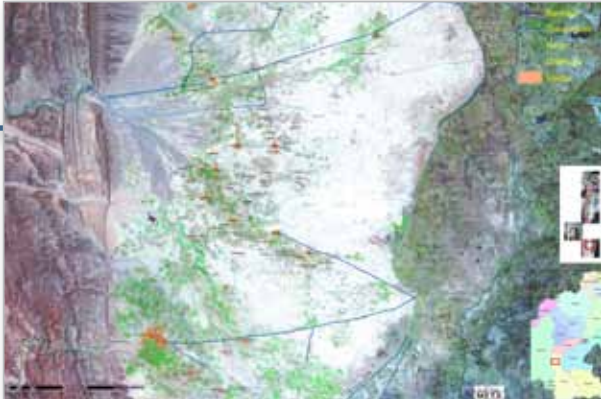
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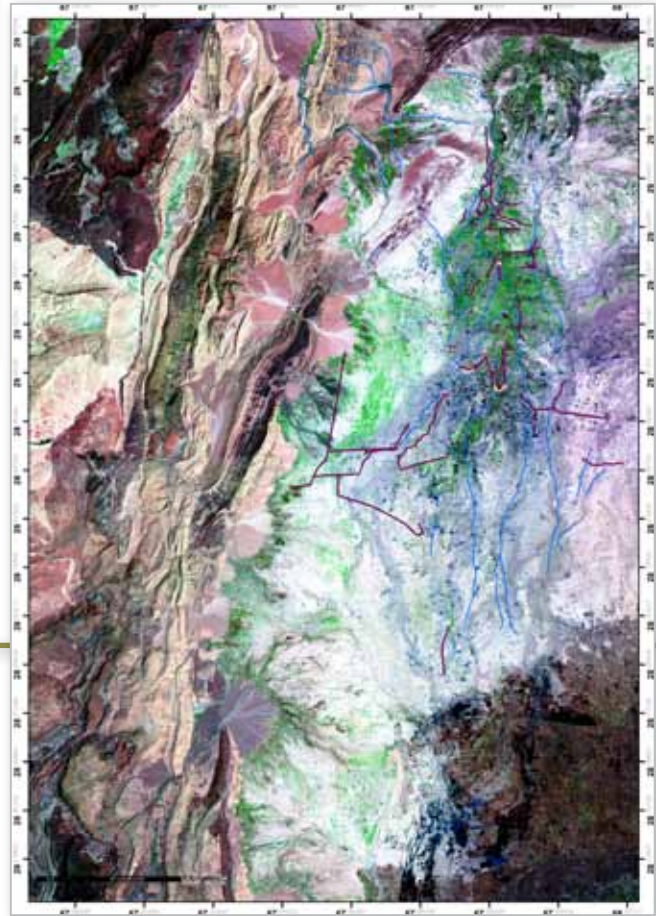
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SPATE IRRIGATION IN PRACTICE AND PICTURES

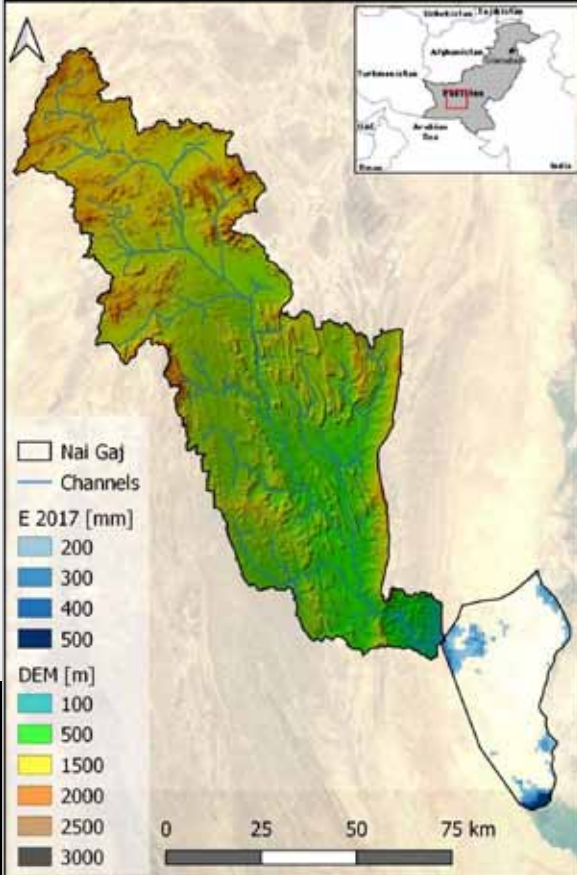
Nai Gaj is a large hill torrent in Dadu District. It feeds the largest spate irrigated areas in Sindh Province (40,000 ha). The Government of Pakistan has recently constructed Nai Gaj Dam on its stream – effecting its hydrology considerably, with sediment now held in the upstream reservoir and less water travelling further downstream – including Lake Manchar.



With approximately 90,000 ha of command area, the Narri River is probably the main spate river in Pakistan in terms of area served. The spate irrigation system along the Narri in Bhag has seen major investments in diversion structures, which have affected the water distribution pattern. The earthen diversion bunds that were used for centuries, have since 2015 been replaced by six government-operated mini barrages, constructed by the Balochistan Provincial Irrigation Department.



Catchment Nai Gaj, Pakistan



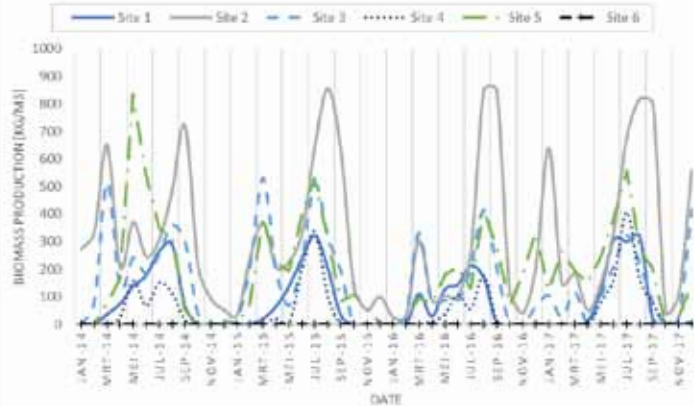
Part 2

Remote Sensing

As part of the NeWaRBI project, a remote sensing analysis was conducted. The aim of this analysis was to obtain an overview of floodwater and biomass production distribution of the past years. This can be used to contribute to the discussions on improved and equitable utilization of productive floodwaters. Additionally, it can be used to identify areas of interest for increasing water productivity and biomass production. Finally, by continuing this analysis over the project period and thereafter, the results can be used to monitor the water and biomass distribution to contribute to evaluating the effect of the interventions.

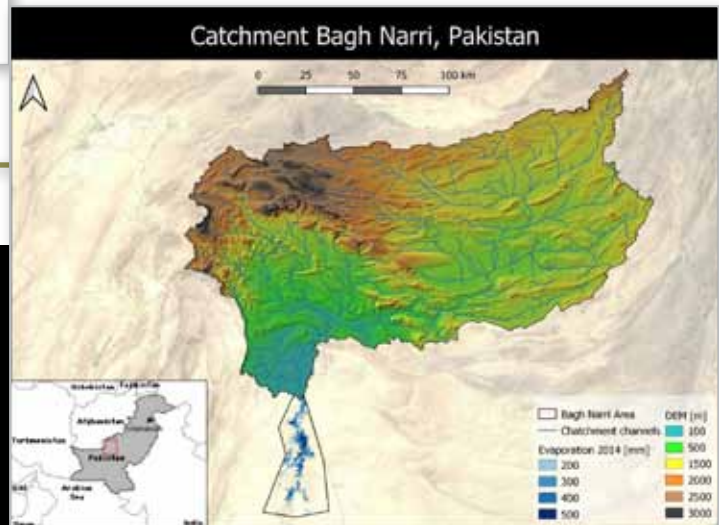
Image showing the Digital Elevation Model of the catchment from which water is supplied to the Nai Gaj spate system. This model shows that an area of over 5,000 km² provides the water on which the area, including the Manchar lake in the Southern part, depends.

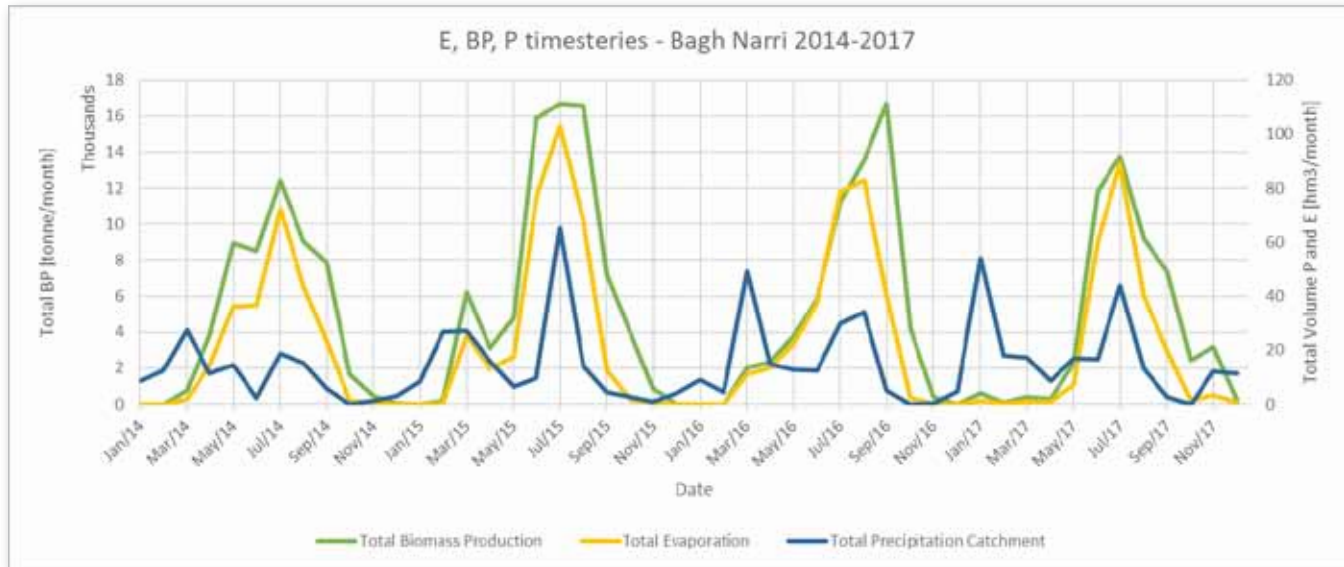
BIOMASS PRODUCTION 2014-2017 NAI GAJ, PAKISTAN



Timeseries of the biomass production in Nai Gaj in 6 selected sites. The graphs show the kilograms of biomass produced per cubic meter of evaporated water. The peaks in production can be identified around the months of July – September, when the spate floods normally arrive in the area.

Image showing the Digital Elevation Model of the catchment from which water is supplied to the Bagh Narri spate system. This model shows that an area of over 20,000 km² provides the water on which the area depends.





Timeseries of Evaporation (yellow), Total Biomass Production (Green) and Total precipitation in the catchment (Blue) for Bagh Narri. The peaks in biomass production can be identified around the months of July – September, when the spate floods normally arrive in the area.

Part 3

Themes

Introduction to project areas

The following pictures provide a general (visual) introduction of Bagh Narri and Nai Gaj. Very common and more specific features are highlighted.



Bagh Narri

Partially abandoned settlement in an area which was formerly depending on spate irrigation as the source of livelihood. Because the water has not reached the area for over 10 years the households migrated elsewhere.



Flooding in one of the communities.



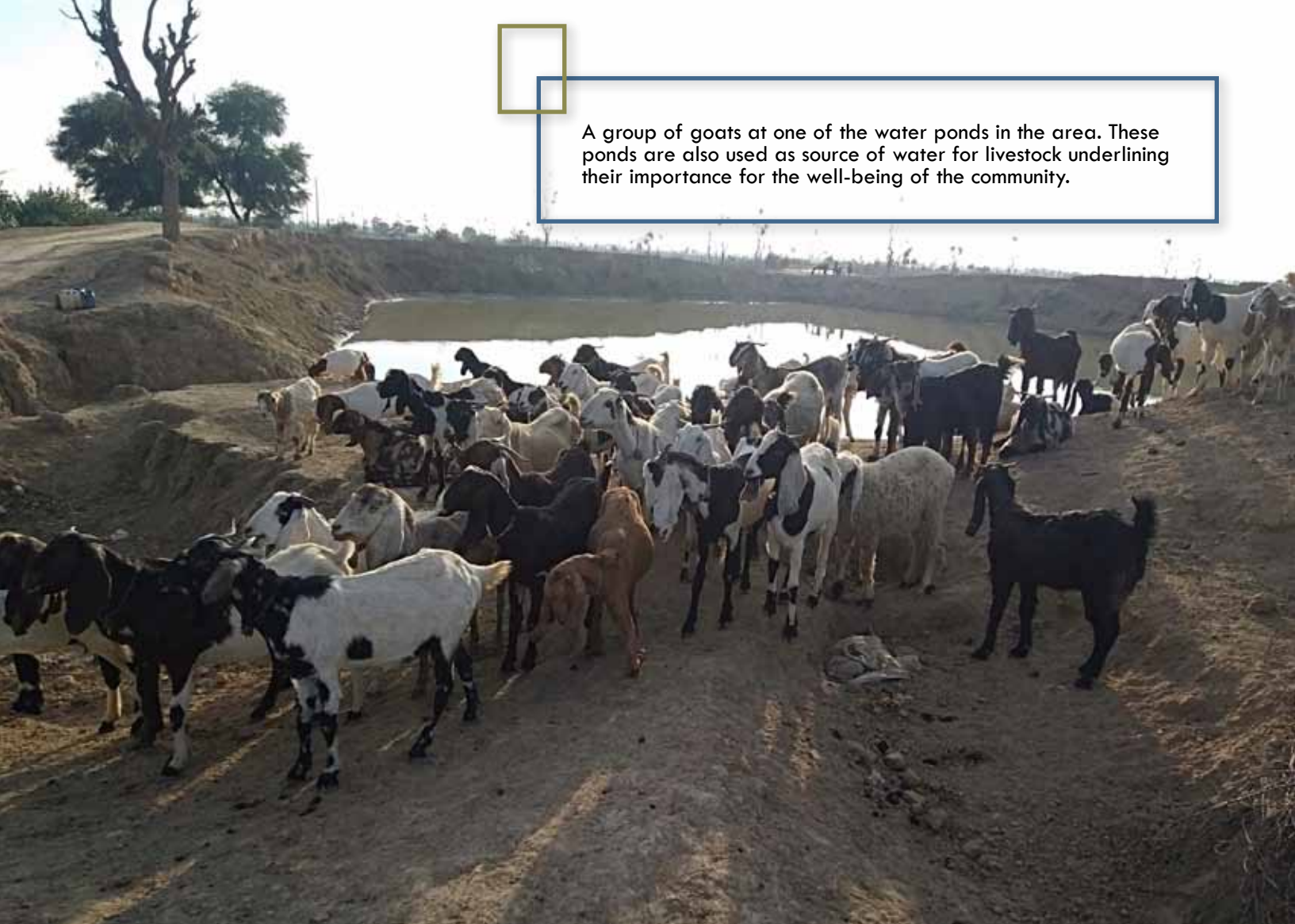
This pond is located on the sides of the settlement and has just been refilled by floods.



Waterfall in Bolan River.



One of the historical places in Bagh. This structure was built in 1780.



A group of goats at one of the water ponds in the area. These ponds are also used as source of water for livestock underlining their importance for the well-being of the community.



A once prosperous place that was abandoned as the spate flows do not reach this place anymore.

One of the historical buildings Sobat Sirai at Sibi.



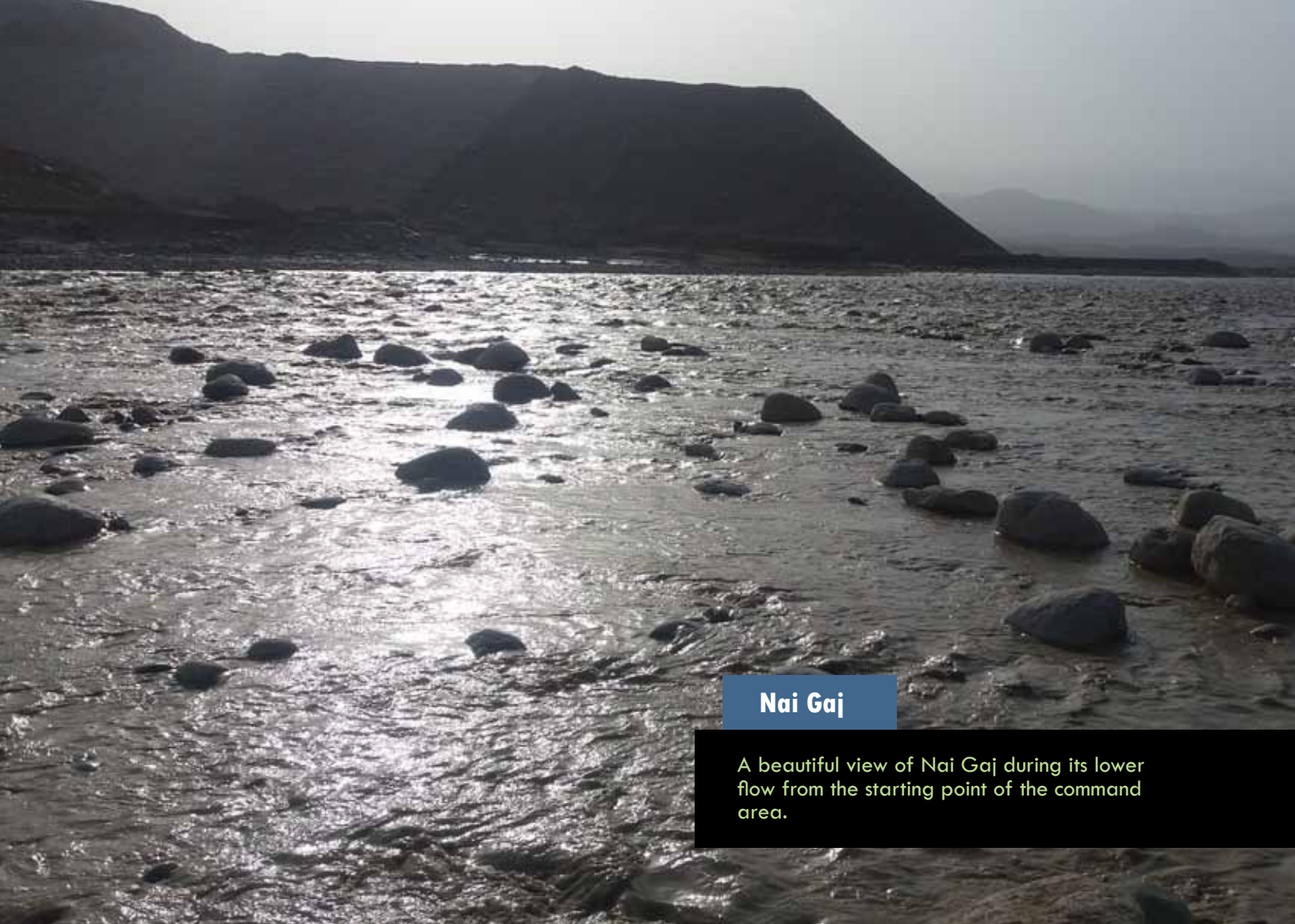


Nai Gaj

Typical village view with standing crops of sorghum and harvested panicles of sorghum and cluster bean ready for threshing by tractor.

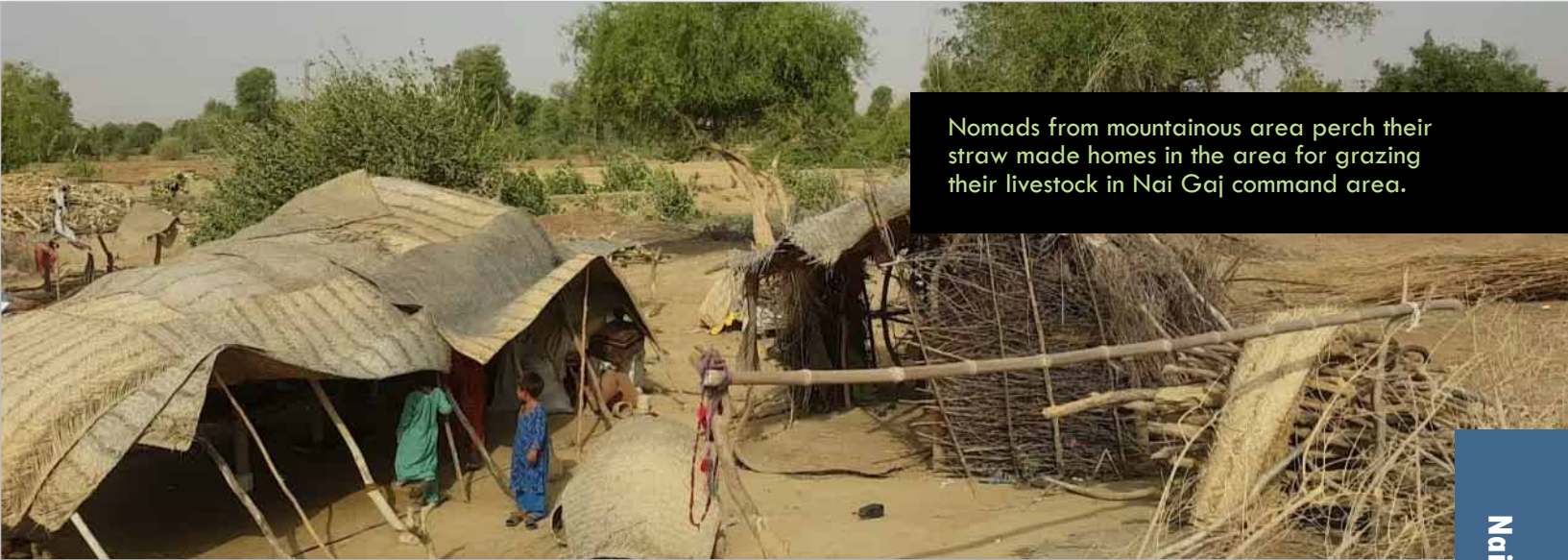
Marking of Nao Wah at the starting point of Nai Gaj from where command area of Nai Gaj Starts.





Nai Gaj

A beautiful view of Nai Gaj during its lower flow from the starting point of the command area.



Nomads from mountainous area perch their straw made homes in the area for grazing their livestock in Nai Gaj command area.

Nai Gaj



Child playing in of the drinking water ponds after the first floods took place.



Meeting in village Lashkar Bhurgri to collect data for the baseline survey.

Children standing on the inlet of a flow, enjoying a dive in the irrigation canal.





Nai Gaj

Temporary bridge, in order to transport and travel during floods until a permanent bridge is constructed.



Nai Gaj

A damaged bridge caused difficulties for people from several villages. The roads department started working on this bridge and temporarily some planks have been laid out to allow crossing the canal on foot.



Nai Gaj

Group of farmers during a field visit in preparation for the project.



Bagh Narri

Group of people portraying at a partially abandoned settlement in an area which was formerly depending on spate irrigation as the source of livelihood.



The camel is widely used for transportation of fodder and other products from the field.

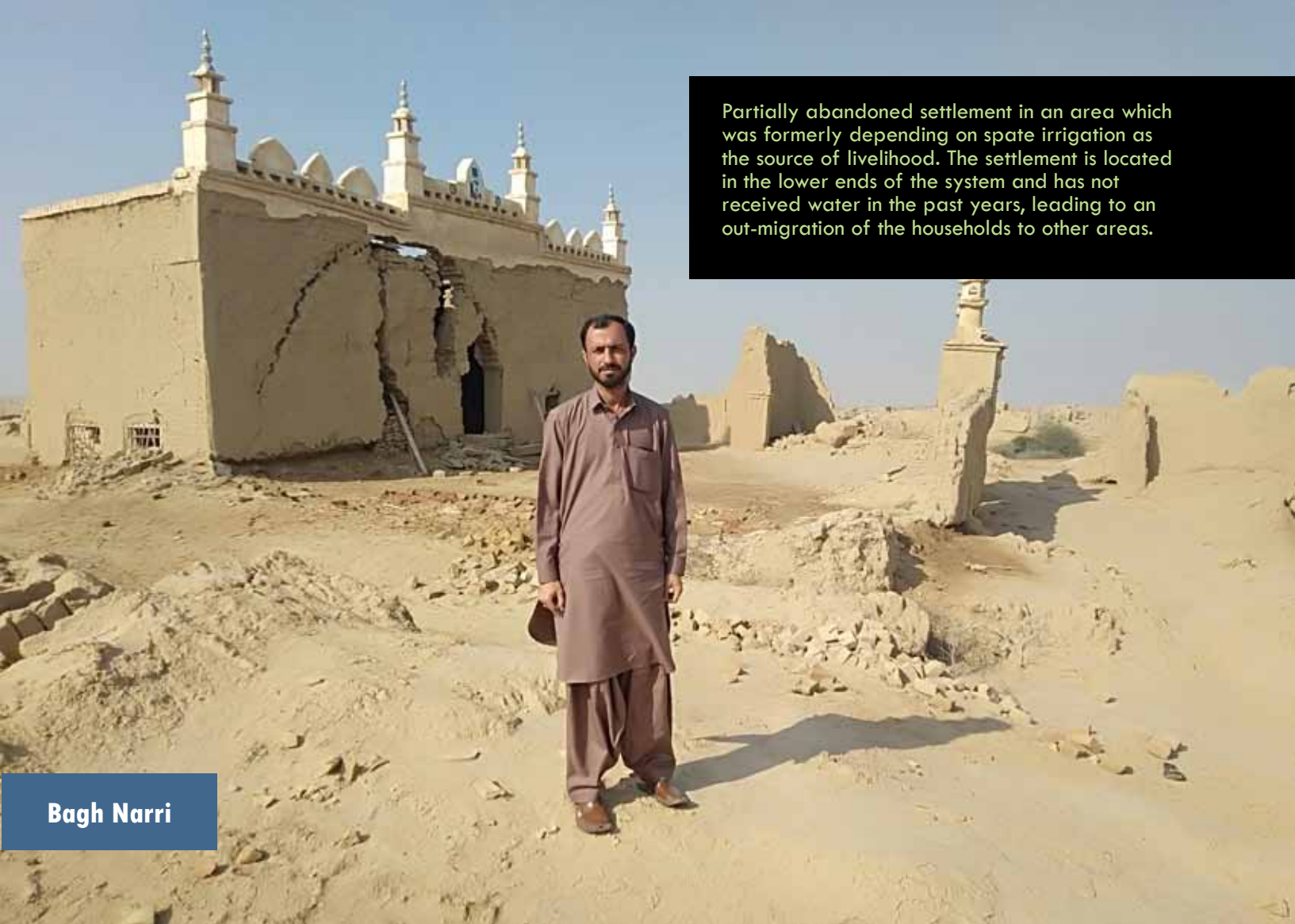
A group of children
at one of the drinking
water ponds in the Bagh
Narri system.

Bagh Narri





Packing the harvested chuff of sorghum into bales and loading it on the truck for transport to Quetta, where the chuff will be used as feed for livestock.



Partially abandoned settlement in an area which was formerly depending on spate irrigation as the source of livelihood. The settlement is located in the lower ends of the system and has not received water in the past years, leading to an out-migration of the households to other areas.

Bagh Narri

Theme 1

Improved and equitable utilization of productive floodwater



Bagh Narri

Focus group discussion with elders in the community to introduce the project and identify the needs at different barrages, command areas and networks.



Water is taken from the pond by the donkeys and people for household purpose. The ponds are filled by the floods that take place during the monsoon season and support the communities in the dry season. In the flood season, the filling of the water ponds is giving priority in the division of the available water.

Bagh Narri

This wadi only occasionally transports water and is dry for most parts of the year. Sedimentation can have a great effect on the course of the waterflow.



The clay soil has cracked significantly, due to evaporation and the high clay content of the soils that were deposited during floods. In spite irrigation, it is extra important to store soil moisture optimally, because cropping often takes place on only one irrigation turn.



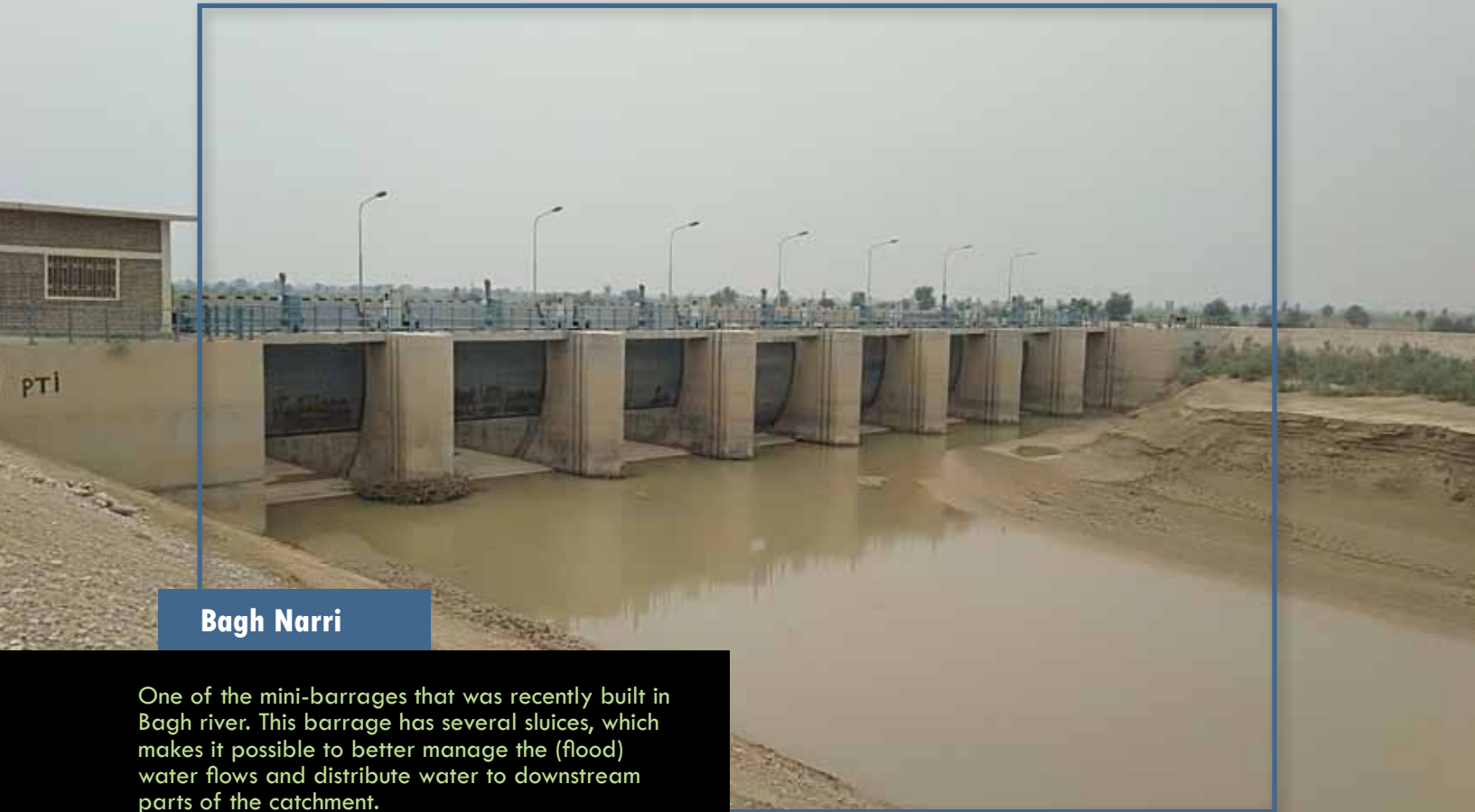


Bagh Narri

Khatoor, flow division point in Bagh river, Baluchistan. The right course is the natural course of the river, but due to the building of dams across the river to divert the water, the river has taken the left stream as (new) natural course.

One of the embankments of the Khatoor flow divider, which is currently dysfunctional.





Bagh Narri

One of the mini-barrages that was recently built in Bagh river. This barrage has several sluices, which makes it possible to better manage the (flood) water flows and distribute water to downstream parts of the catchment.



The chuff biomass from mung and moth beans has been collected and is placed on a truck to be transported to the markets in Quetta to be sold as livestock feed.

Sorghum panicles after harvest. They will be left to dry in the sun after which the kernels are separated.



Bagh Narri

The sediments that come with the flood water can, if not managed well, cause problems and bring damage to structures and roads.



Structure to divert the flood water in order to protect the road.





This 10-mile-long diversion boulder was first constructed in 1930s to divert Nai Gaj water from eastwards to southwards. After it was damaged in 1995 by an enormous flood, it has been reconstructed in 1996.

Nai Gaj


One of the two lined channels which are meant to divert water for the Nai Gaj river, after completion of the Nai Gaj dam.






Land preparation in Nai Gaj spate system,
constructing diversion structures and field bunds.


Nai Gaj




A rain and flood water harvesting pond in Village Chidri.



A farmer struggling to close the breach, after fully irrigating his piece of land, called Bana, using branches of trees and soil.



Mung and chickpea crops, mostly grown by farmers in upstream areas of the command area of Nai Gaj.



Method of irrigating land. A group of 8 to 10 sturdy men have to work hard to control and plug leaks.



Water masters and others on a newly constructed main earthen bund, locally called gandho. Sometimes, government subsidizes the construction of gandhos.

Meeting in village Wali Muhammed Jo Gandho as part of the formation of Farmer Networks.



Inspection of one of the newly constructed embankments in Nai Gaj, Sindh.



Nai Gaj



Inception workshop of the NeWaRBI project.



One of the water masters in Nai Gaj with project staff of RDF.



Nai Gaj

Community meeting in Sindh. Community members develop a map of their community with land marks such as the school, water points, etc.

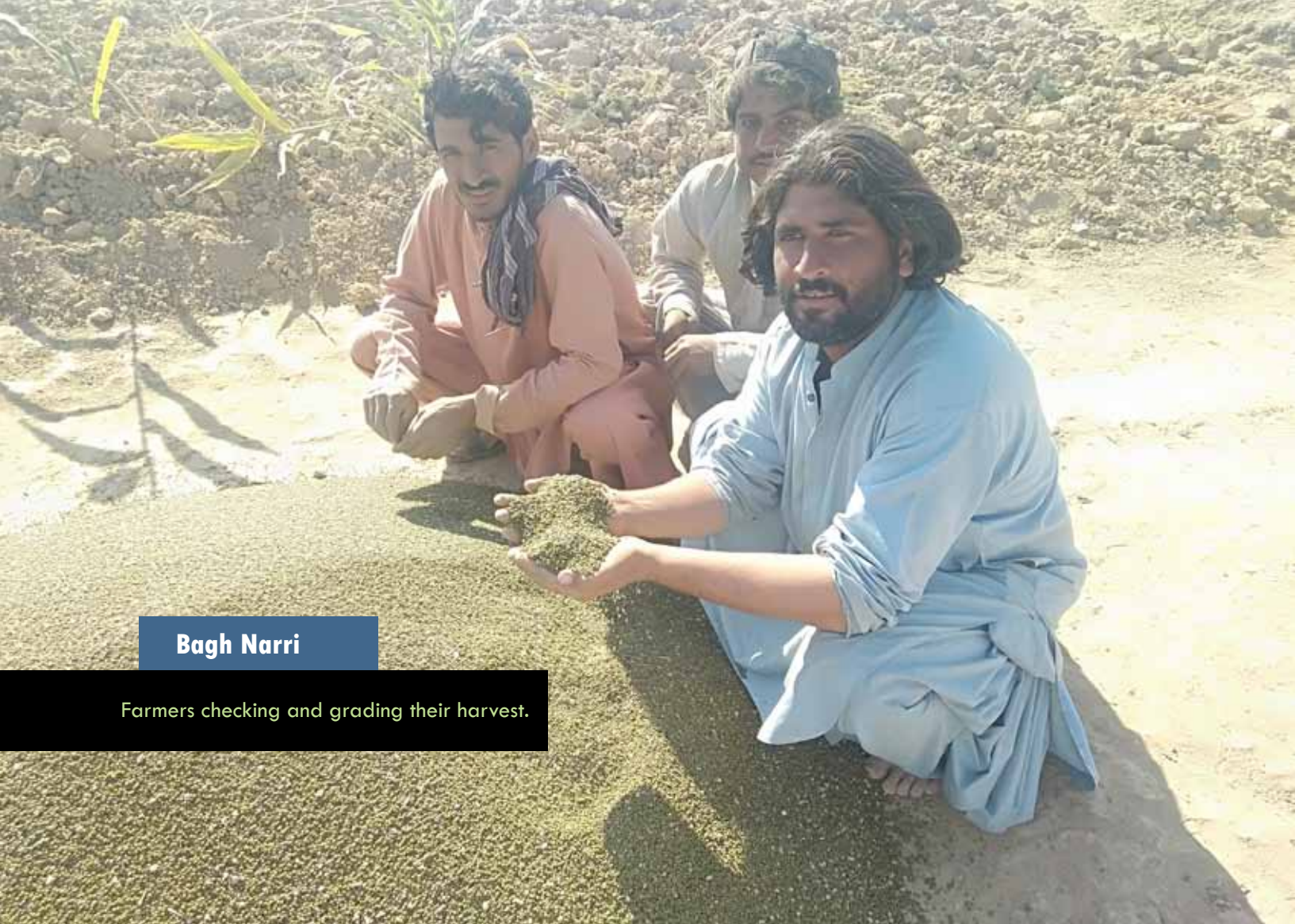
Representatives of the Irrigation Department of the Government of Balochistan, together with the project manager from SPO, working in Balochistan.



Farmer in his field walking home after a days' work.



Bagh Narri



Bagh Narri

Farmers checking and grading their harvest.

Meeting among a group of farmers.



Bagh Narri

Group discussion with farmers in Bagh Narri while enjoying traditional dishes.



Theme 2

New livelihood opportunities through improved land and water management practices



Bagh Narri

Transporting harvested firewood home to use for cooking and heating of water.

A photograph of a farmer crouching in a field of sorghum plants. The farmer is wearing a light-colored shirt and pants. The field is filled with tall, green sorghum stalks. The ground is dry and brown. The farmer is looking towards the camera.

Bagh Narri

Farmer in his field, which is currently under production with an intercrop of sorghum.

The harvest of moth and mung beans (green in far end is mung) is on the land, dried and ready to be packed and transported to the market.





Bagh Narri

Increasing pond size in the dry season to be able to store a larger volume of water during the monsoon. This will help to support the community with more water.



Oilseed crop growing on the fertile soils in the spate system.

A group of white Bhag Narri cows are gathered in a rural setting. In the background, there are several mud-brick buildings with dark openings, likely doors or windows. A single, tall, thin tree stands against a clear blue sky. The foreground shows a dirt path and a large, light-colored log or piece of wood lying on the ground. The cows are of various sizes and are looking towards the camera. The overall scene is bright and sunny, suggesting a clear day.

Bagh Narri

Famous Bhag Narri Breed cows are kept at the house of the owner and eat fodder at this place. In particular periods of the year, they are allowed to graze on the fields, after harvest has been collected.



The mung and moth beans have been harvested and, and are dried before being threshed.

Bagh Narri

Focus group discussion to identify good practices and challenges in the communities dependent on spate irrigation.



Nai Gaj


Grafted Jujube is grown by a progressive farmer on a small low-cost tube well.




A photograph of a Sorghum field. The plants are green with long, narrow leaves and large, dark, textured panicles. The background is a pale, overcast sky. The image is framed by a thin white border.

Nai Gaj

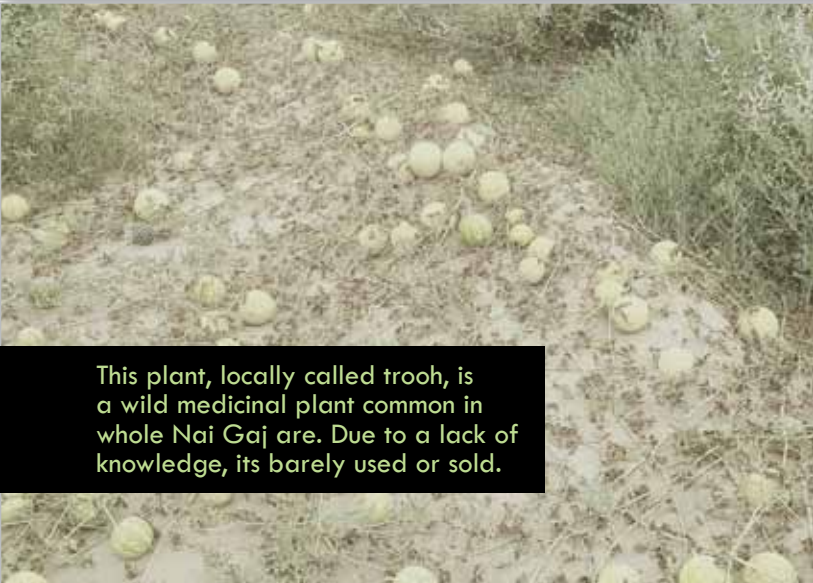
Sorghum is the main crop in the Nai Gaj spate-irrigation area.




This donkey flour grinder grinds flour for whole village.



Nomad families descend from the western mountainous area of Balochistan with their large sheep and goat herds to graze during crop harvesting season.



This plant, locally called trooh, is a wild medicinal plant common in whole Nai Gaj are. Due to a lack of knowledge, its barely used or sold.



A roadside vendor selling famers tools. In upper row scythes or sickles, and in the lower row axes.

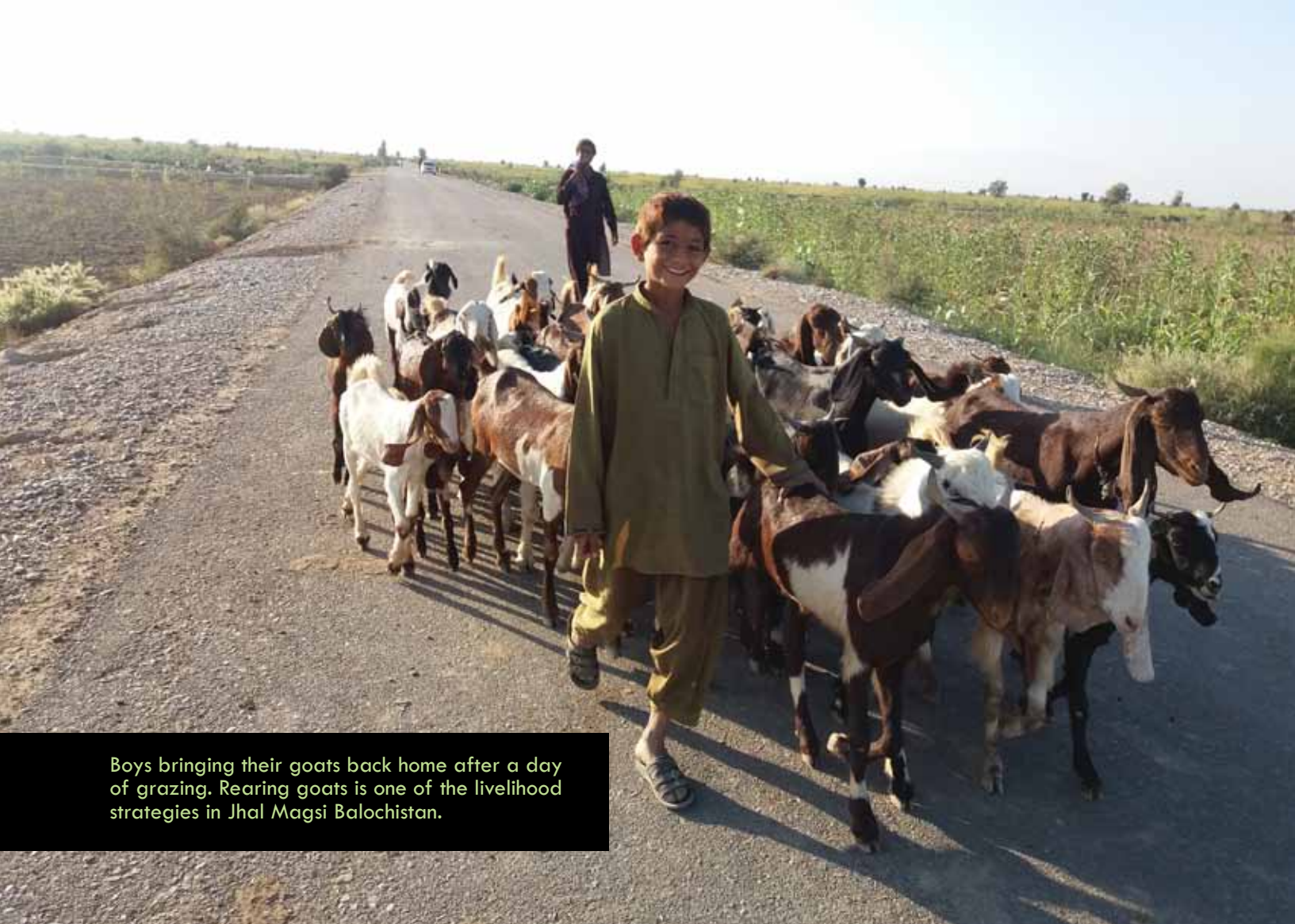


An old bull cart, resembling one found Moen-jo daro, which is an archaeological site dating back 5000 years. The rare bull cart is still in use in some villages in Nai Gaj area.



Nai Gaj

Women in Village Fateh Brohi discussing the activities under the project and providing input in the design of the gender-related activities.




Boys bringing their goats back home after a day of grazing. Rearing goats is one of the livelihood strategies in Jhal Magsi Balochistan.

Nai Gaj

A small low-cost tube well on solar energy is used by a progressive farmer in Village Wachho Pat to grow vegetables and fruit trees.





A farmer in Wachho Pat diverting the water to his fields. The water is pumped from a well using solar power.



Nai Gaj

Alternative livelihood derived from making products from wild plant pesh, one of the sources of additional income, especially for women in the villages.



Sharing of local best practices and alternative livelihoods from spate-irrigation brochure, allowing the community to discuss what practice fits well with their situation.



Clay pots used to store seeds which will be used during the next cropping season.



Bagh Narri

Donkeys are used for the transportation of water from the drinking water ponds to the communities. Especially towards the end of the dry season, when the water ponds are drying up, communities are dependent on this form of transport for their source of water for domestic use.

Spate irrigation is a unique water resource system that makes productive use of short duration floods in dry riverbeds. It is common in Pakistan, covering an area of 1 million hectare. This photo book aims to give an impression of two spate irrigated areas in Pakistan. These areas are located in Sindh and Balochistan and are respectively called Bagh Narri and Nai Gaj. After an introduction of this photo book and the project, some maps and remote sensing images are shown and discussed. Furthermore, some general pictures are shown, followed by pictures on (use of) floodwater and livelihood opportunities. This photo book is built around the working packages from the NeWaRbi (New water rights for basin management and inclusivity in spate irrigated areas of Pakistan) project. This photo book is meant to both inspire and inform the reader about spate irrigation in these areas and the NeWaRbi project.

More materials & further readings

On the website of the Flood-based Livelihood Network, much more relevant materials can be found. For videos on spate irrigation and other flood-based livelihood strategies, the website of TheWaterChannel is a great source.

FBLN website : <http://www.spate-irrigation.org>

Resource documents FBLN : <http://spate-irrigation.org/resource-documents/>

Photo library FBLN : <http://spate-irrigation.org/resource-documents/photo-library/>

TheWaterChannel : <http://www.thewaterchannel.tv/dossiers/livelihoods-from-floods>

Colophon

This photo book has been compiled as part of the NeWaRBi (New water rights for basin management and inclusivity in spate irrigated areas of Pakistan) project by MetaMeta, RDF (Research Development Foundation) and SPO (Strengthening Participatory Organisation).

This photo book was prepared by Allah Baksh (SPO), Gulsher Panhwer (RDF), Reinier Veldman (MetaMeta) and David Mornout (MetaMeta). Maps have been made by Taye Alemayehu (MetaMeta). The remote sensing analysis has been performed by Esmee Mulder (MetaMeta). Allah Baksh (SPO) and Gulsher Panhwer (RDF) have provided most of the pictures.

For more information and resources on Spate Irrigation and other Flood-Based Farming Systems visit www.spate-irrigation.org or contact us through info@spate-irrigation.org.



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