



Flood Based Livelihood Systems – an Introduction



META
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Flood-Based Livelihoods
Network Foundation

Flood based livelihood systems

What are flood based livelihood systems

Extent

Types

Special characteristics

Why invest in it

Example of innovation

FBLN



Floods could surprise you – we may think of them as a hazard but they are an asset just as well



FBLS makes use of temporarily predictable flood water to support farming, fishery, grazing grounds, recharge and groundwater storage



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Methods of Flood-based Farming

- **Spate Irrigation**: diversion, distribution and management of short duration flood flows from seasonal or ephemeral rivers
- **Floodplain agriculture**: cultivation of flood plains, using either receding or rising flood water or both
- **Inundation canal systems**: as above with high water canals guiding the flood water
- **Flood-spreading weirs**: using a series of weirs to manage and spread floods for rehabilitating degraded land, enhancing ground water recharge
- **Roads for water**: Water harvesting from roads for multiple use

Spate Irrigation



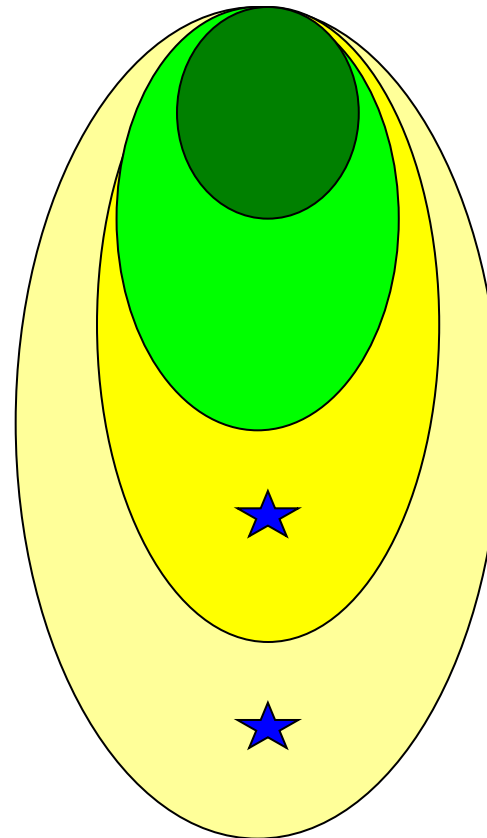
Characteristics of spate irrigation scheme

Foot of mountain range

Plain

Plain

- Three crops
- Two crops
- One crop
- Occasionally one crop



★ Tube-wells

Flood-plain agriculture - recession







Figure 1: Flood recession rice cultivation on a Cambodian floodplain (Mekong River Commission 2009)

Flood-plain agriculture – flood rise

- Deep water rice that grow in flooded conditions: water > 50 cm deep for at least a month
- More than 100 million people in South and Southeast Asia rely on deep-water rice for their sustenance
- Adaptation strategy: advanced elongation ability





Figure 7: Niger inner delta flood front (source <http://stock.parallelozero.com/>)

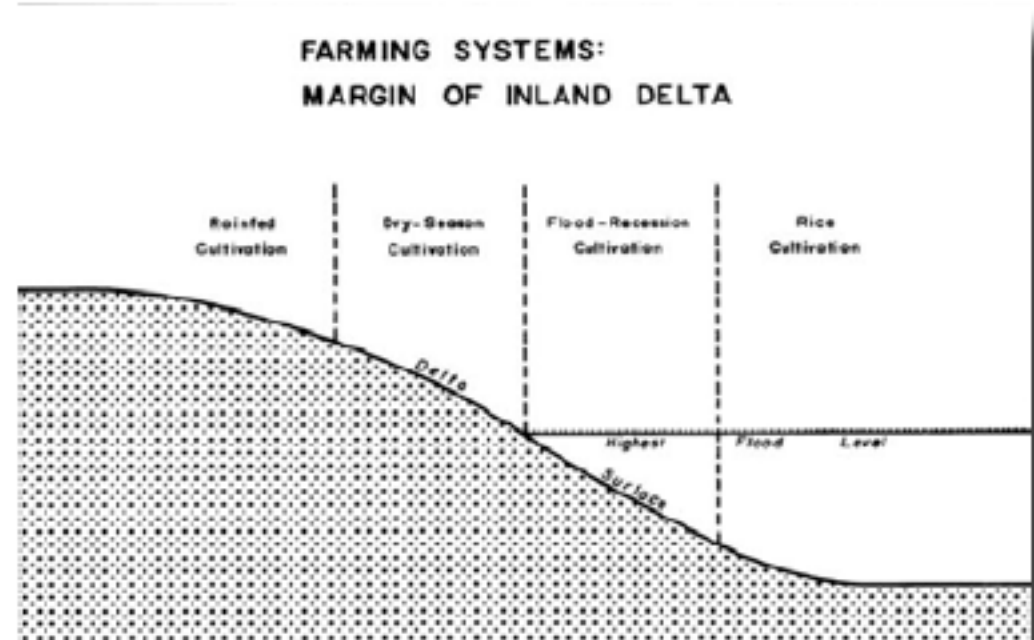


Figure 8: Types of cultivation at the margins of the Niger Inland Delta (Thom & Wells 1987)

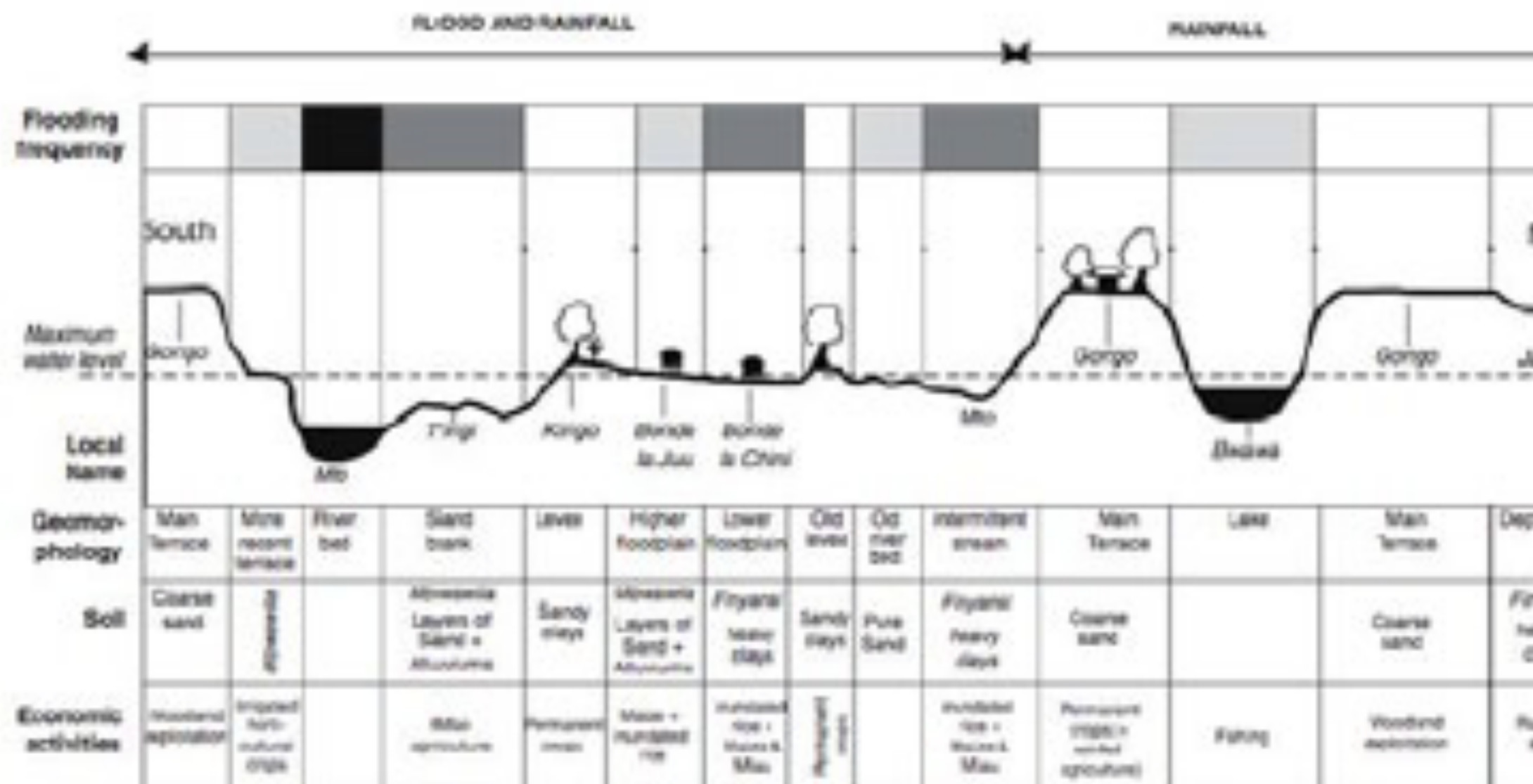
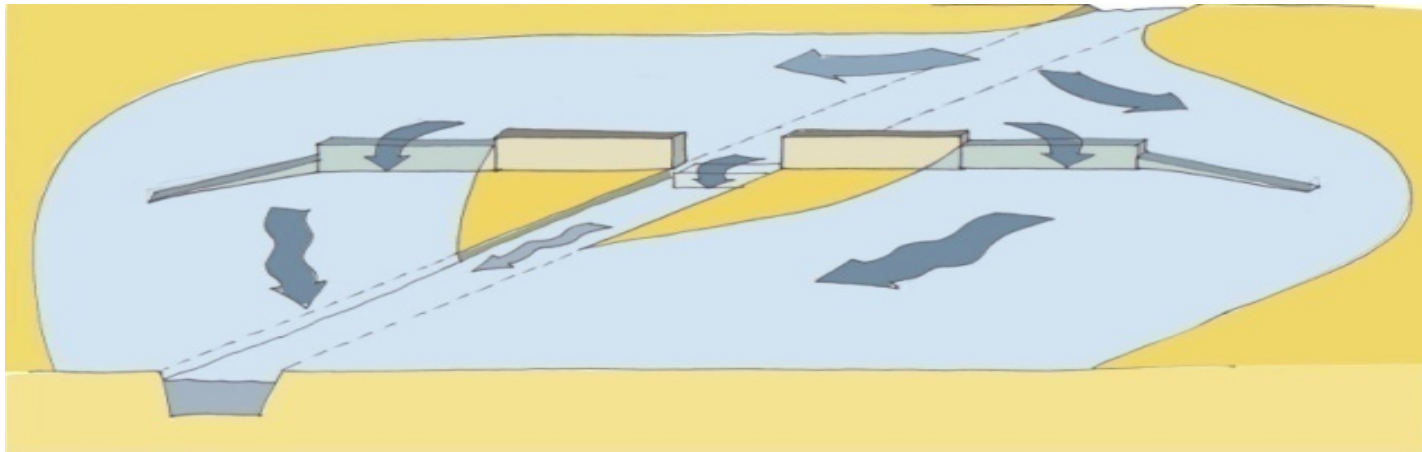
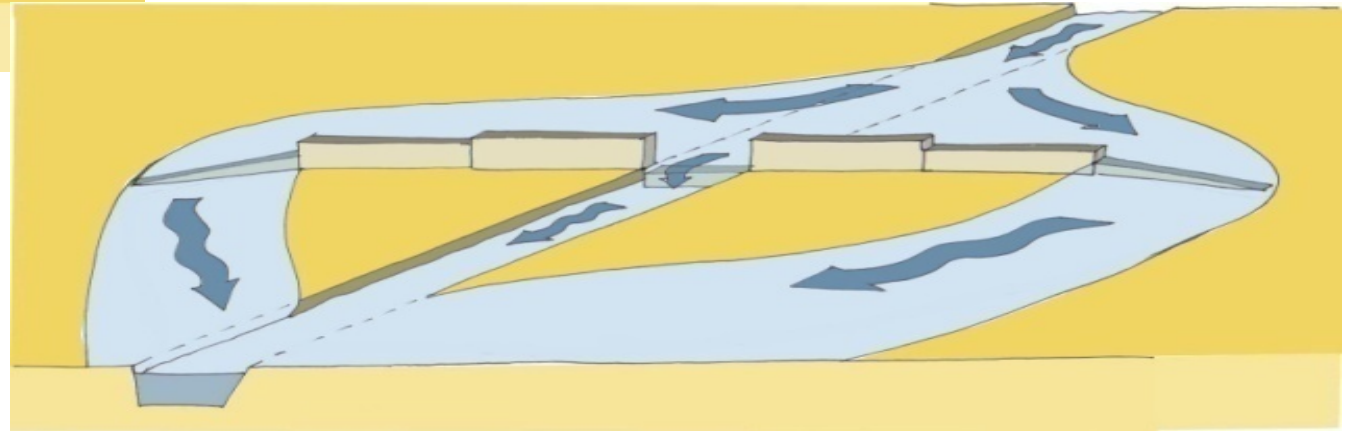
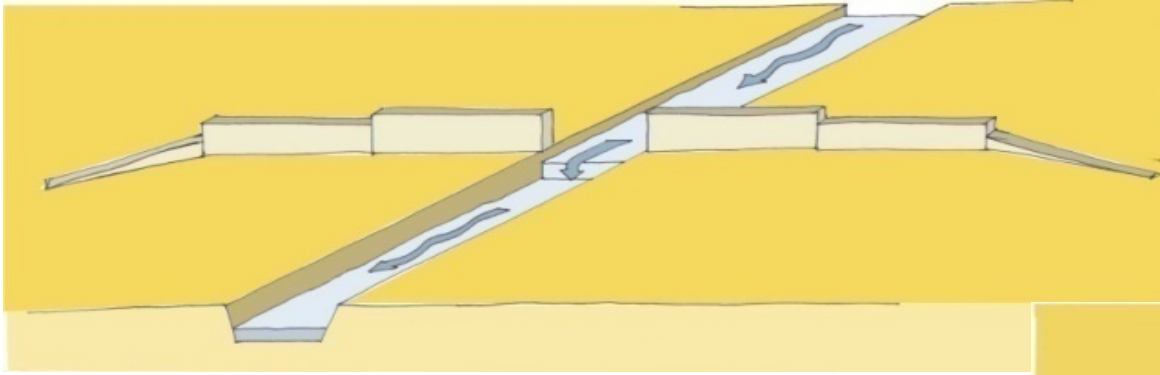
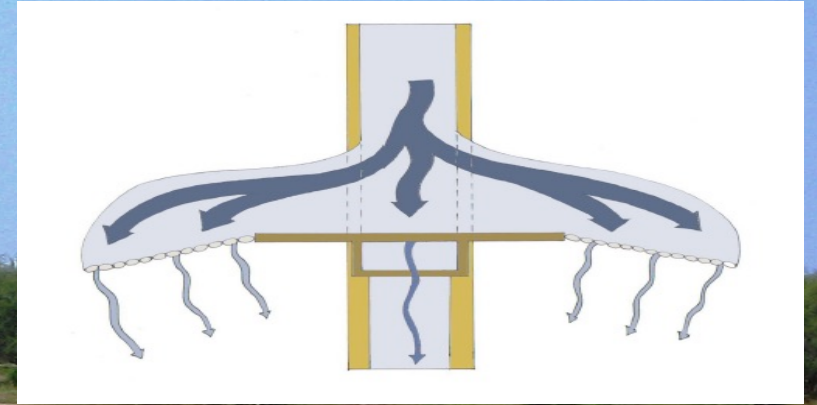


Figure 11: Cross-section showing geomorphology

Floodwater spreading weir



Niger: Floodwater spreading weir = Roads (Giz, Dieter Nill)



Harvesting floodwater from roads



Floods bring huge sediments: A blessing, but also special challenge



Annual average field rise: 3 cm

Up to 10% sediment concentration in floodwater



In some fields sediment deposition reaches up to 3 m



Farmers trying to
raise canal water
level to irrigate
fields

Flood-based Livelihoods is an Innovation?

Reversing the destructive nature of floods and huge sediment challenges they bring along into a blessing for:

- Increased cropped area and higher yield: cereals, oil seeds, pulses, fruit trees
- Preserving biodiversity, rehabilitation of degraded environments
- Better groundwater recharge
- Domestic and livestock water supply
- Mitigating climate change impact and variability

More reasons why we should invest in FBFS

- They constitute poverty pockets - central to our effort to lift 700 to 800 million people out of poverty and into prosperity.
- They are significant: 15 Million ha in arid and semi- arid regions in SSA - 30 million ha worldwide.
- Much of the potential is still unharnessed - they are orphans left-out between rain-fed and conventional irrigated Agriculture.
- Much scope for innovation

Low Human Development Index?

Most countries in Africa

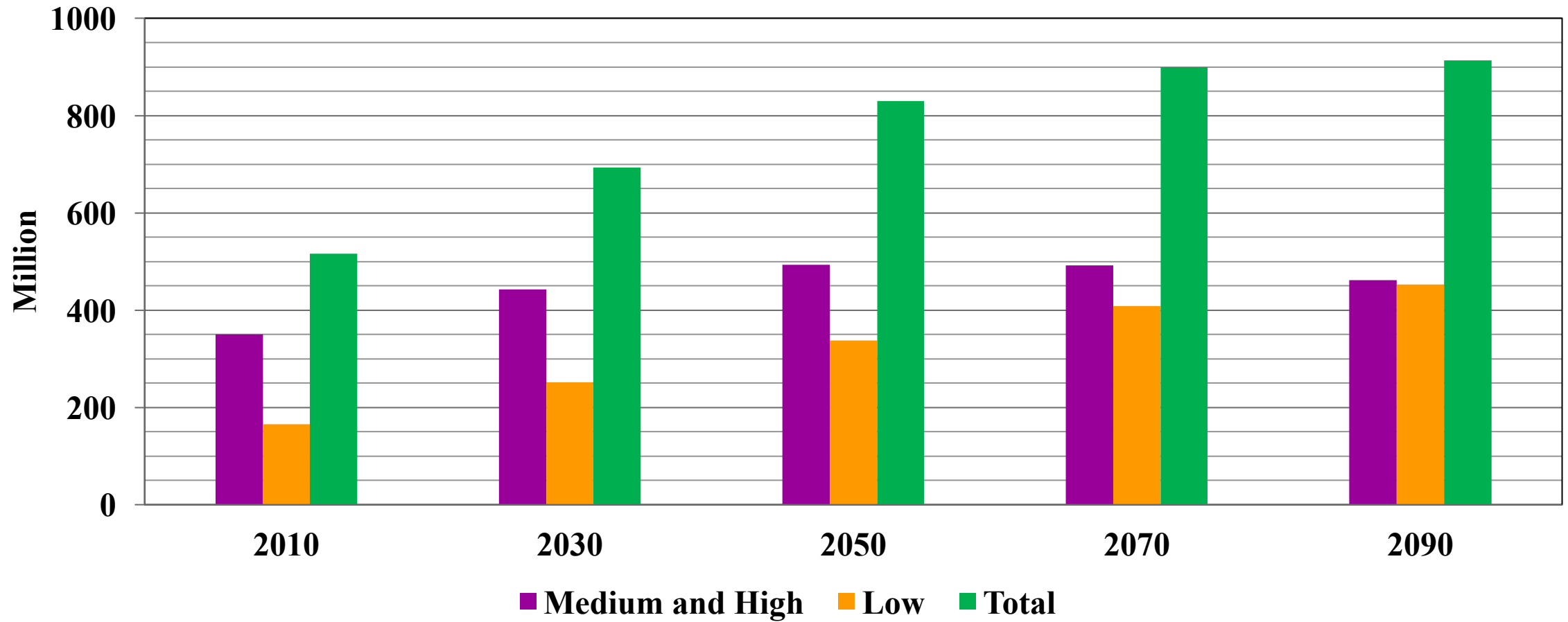
- majority of population is farmer (> 50%)
- low productivity
- lack of inputs and resources to increase productivity
- weak institutional capacity

Medium and high human development index?

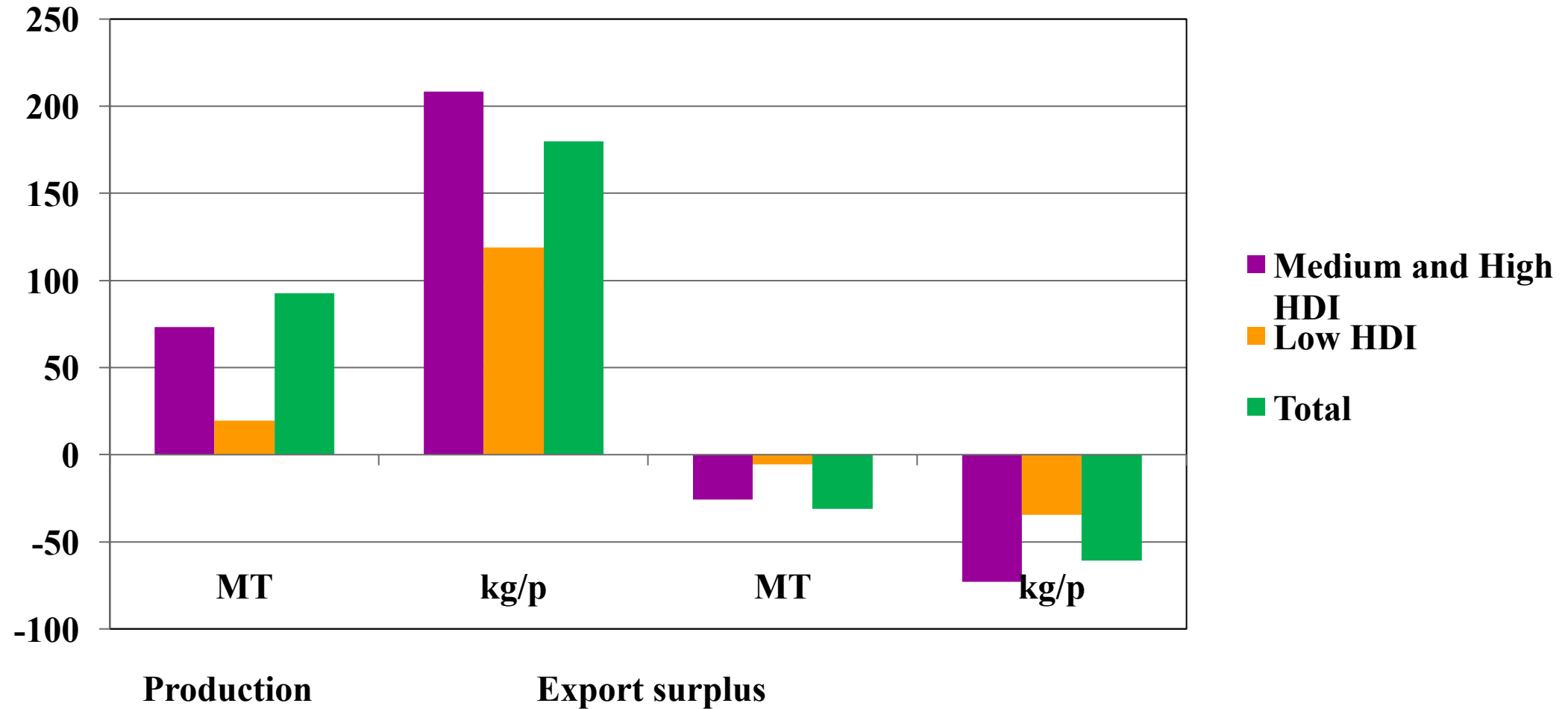
Most countries in Eastern Europe, in Central and South America and in Asia, including Russia, Brazil, China, India, Indonesia, several countries in Africa

- growing economy driving farmers from their land to urban areas
- increasing demand, increase in production
- increase in farm sizes, mechanization
- higher-value crops to make a living on a relatively small plot
- part-time farming, in combination with a job in industry or service sector

Population in Countries with (Flood) Spate Irrigation



Cereal data in Countries with (Flood) Spate Irrigation



We should invest – FBFS are productive



Chick pea - yield

- Rainfed: 400 to 600 Kg/ha - rain fed
- Irrigated: 2000 - 5200 kg/ha -

Fogera Flood plain - Flood recession: North West Ethiopia, East of Lake Tana



We should invest – FBFS are productive

First harvest :
4 ton/ha sorghum

**Second harvest
(ratoon):**
2 ton/ha

Third crop: water
melon



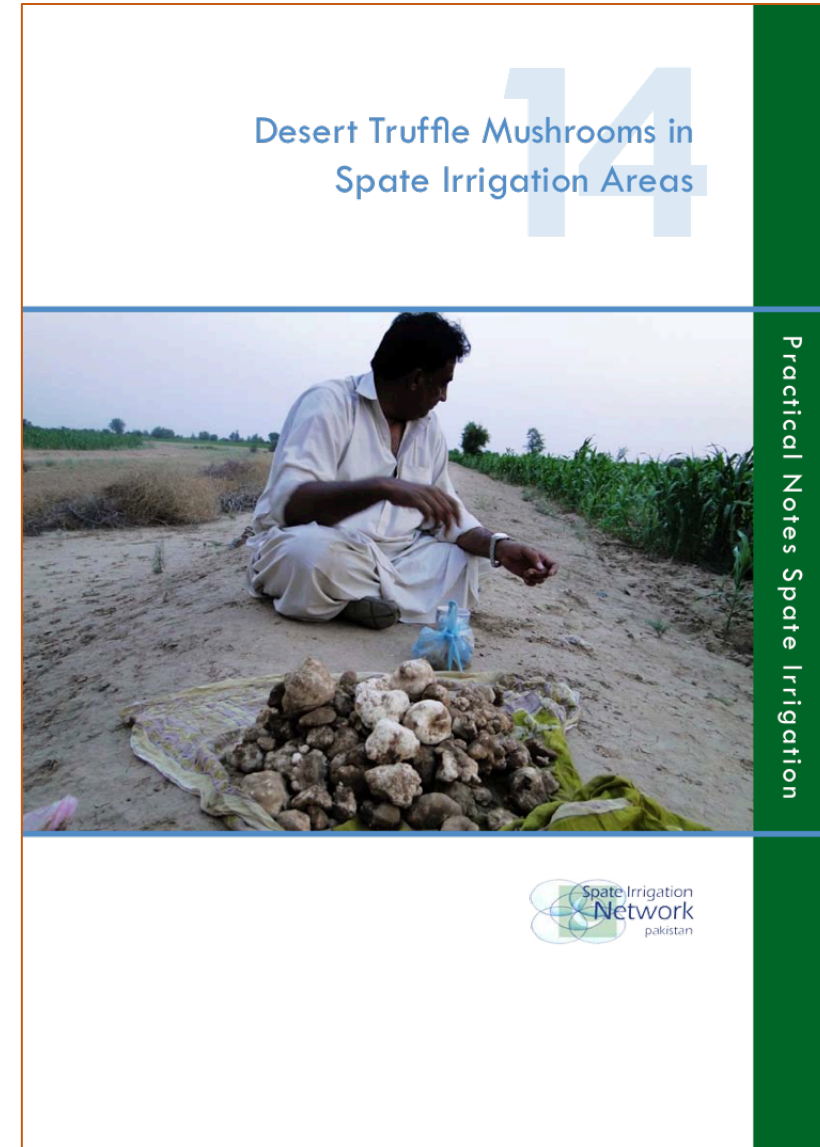
Wadi Mawr Scheme, Yemen

Preserving biodiversity & providing livelihood

Spate systems are
Depositories of local
biodiversity - Natural
species of vegetation are
often of considerable value
and may provide additional
source of income to local
communities



Leading to promising niche crops: mushrooms and wild vegetables



We should invest in FBFS: often the only source of water:
Gash river fed reservoir in Sudan Flood is the only source



We should invest in FBFS: Cotton production in Toker, Sudan



Flood spreading weir: Niger we should invest n FBFS: Gash, Sudan)

Rehabilitate degraded land,
improve groundwater recharge
and agricultural productivity



Scope to do more: Soil bunds with porous spillways

- Pioneered in 10 000 ha FBFS in Dera Ismail Khan Command area of Daraban in Pakistan (building on a long tradition of earthen guide bunds)
- The porous stone spillway allows slow, continuous seepage preventing upstream floodwater pressure build-up thus protecting the earthen bund from destruction
- In Pakistan and Yemen have successfully reduced the frequency of failure of earthen diversion bunds.



Soil bunds with breachable bunds...

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We should invest: road flood water management - preventing landscape degradation and more...



Economic benefits: Harvesting water from roads

	USD/km	% annual damage	% caused by water	Water damage USD/year
High way	1,250,000	6	35	22,500
Feeder road	180,000	10	80	14,400
Gravel road	40,000	20	80	6400

Investment:

Water harvesting structures: USD 1,800-3,000/km

Modification to road design: USD 8,000-80,000/km

Return - benefit

Pay back in reduced road damage 1-4 years

Reduced erosion and flooding +++++

Water harvesting benefits +++++

Huge potential for better field water management

No overflow control structures



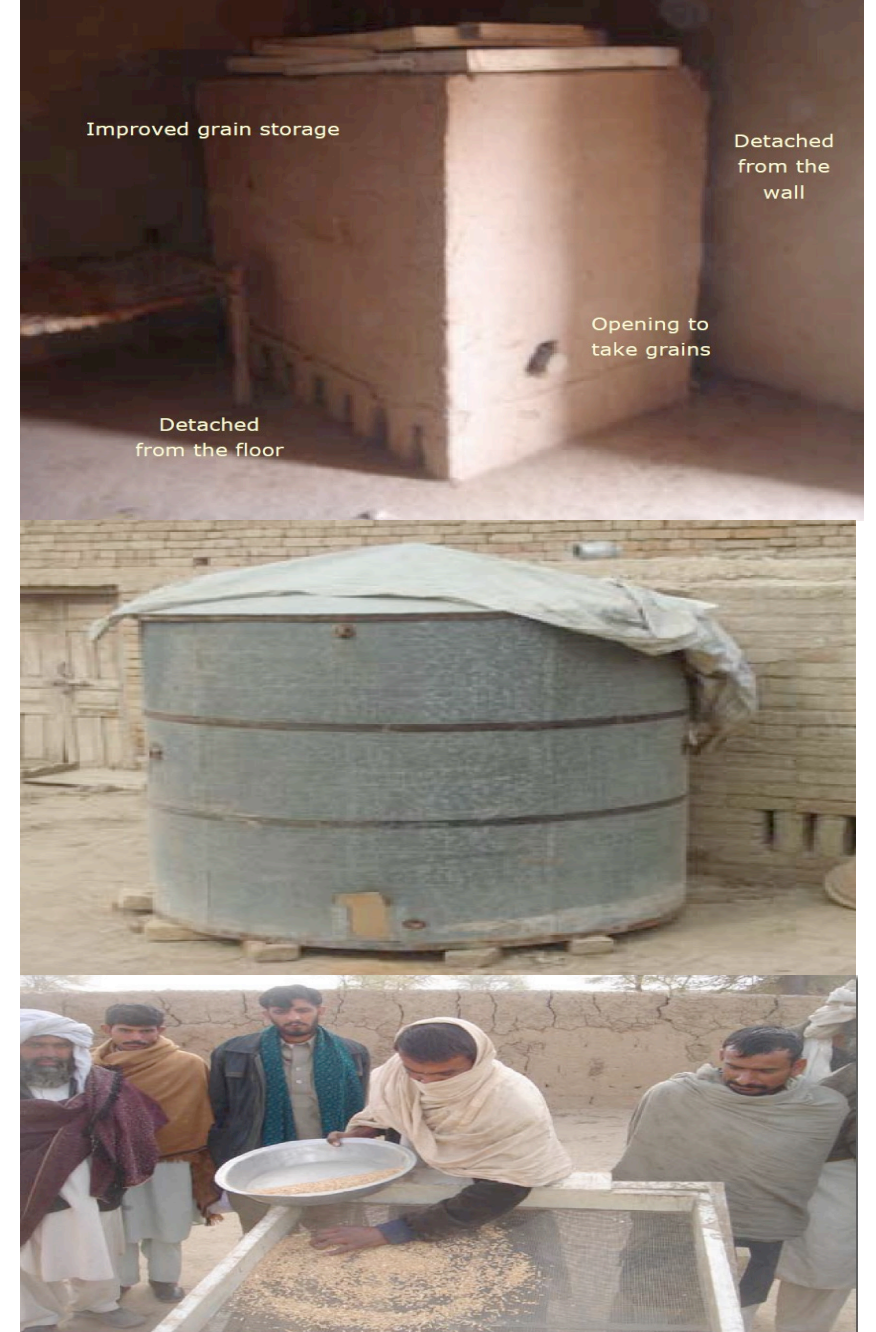
Open field intake with stop blocks

Orifice with settling basin
for sloping fields



Improved grain storage

- These earthen containers of 150 by 90 by 120 cm, containing 1200 kg of grain, are placed free from the walls and floors, containing an opening closed with a wooden plug to take out the grains.
- Similarly a closed metal container with an opening at the bottom to take out the grains
- Grain should be cleaned before storing



Improved livestock breeds

- **Red Sindhi Cattle (from Pakistan):**

- Dairy breed with a milk yield per lactation from 1200 to 2000 litres
- Adult male weigh 400-500 kg and the female 300-350 kg
- Adapt very well to stressful environments

- **Bhagnari Cattle (from Pakistan):**

- Low milk yielders
- Adult males weigh 450-600 kg, while females weigh 325-425 kg
- Males are suitable and excellent for heavy draught work

Red Sindhi Bull, Pakistan



Environmental threats: invasive species



Controlling and/or Using Prosopis
Juliflora in Spate Irrigation Systems



Practical Note Spate Irrigation

Scope for innovation – from Africa to Asia and back – we need a network

Case: Bangladesh Floating bed cultivation



Scope of Floating farming systems

- Widely used in different parts of the world since prehistory
- In Bangladesh this is practised in remote waterlogged villages
- The potential for floating farming systems is large as floodplains are inundated every year:
 - 30 % of floodplains is flooded deeper than 1 meter
 - When monsoon is heavy floodplains this rises to 60% making Normal agricultural activities difficult to undertake
- Climate change adaptation method (as Bangladesh is prone to sea level rise)

Floating bed cultivation Bangladeshi style *Dhap*

- Floating platform made of decomposing heaps of water hyacinth
- Upper surface layer of ash, coconut fibre and (occasionally) soil
- Size and shape vary from region to region
- Usually the field areas are 50-60 meters long and 1.2 – 1.5 meters wide with a thickness of 25 to 50 cm.



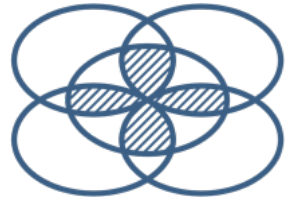
Cultivation

- Farmers make a layer of water hyacinth and leave it to decompose by the following process:
 - Farmers place long bamboo on the mass of mature hyacinths (mature decomposes faster than immature), then pulling the hyacinths from both sides of the bamboo and flattening them with his feet. After construction the bamboo will be removed.
 - After 7-10 days a second layer of hyacinths is placed over the first layer
- In general the floating bed needs 15-20 days to decompose
- Compost is placed on the bed before seeds are sown

Cropping pattern

- Crops in this system: 23 types of vegetables and 5 types of spices.
- The vegetables and seedlings raised on the floating beds are: Ladies finger (Okra), Cucumber, Ridged gourd, Bitter gourd, Snake gourd, Amaranth, Brinjal (egg plant), Pumpkin, Indian spinach, Taro, Wax gourd, Turmeric, etc. as monsoon crops. Apart from these Spinach, Bottle gourd, Yard long bean, Bean, Tomato, Potato, Cauliflower, Cabbage, Kohlrabi, Turnip, Radish, Carrot, Ginger, Onion, Chili, Garlic, etc. are belonging to winter crops. Some vegetables are grown on the bed all the year round rotationally.





Flood-Based Livelihoods Network Foundation

- Network
- Network of professionals (800) > now becoming network of farmers
- Country chapters (4>10)
- > All flood based livelihood systems
- Resources:
 - Practical Notes, Guidelines, Overview Papers
 - Library
 - Training package, taped lectures, presentations



Spate Irrigation Network Foundation



“Floods are not always a hazard. They may also sustain aquatic life and riverine biodiversity, recharge aquifers, enrich soils and in some of the world’s poorest areas they are the main source of irrigation.”

Global Water Partnership (2000) ‘Toward water security: a framework for action’



NEWS

- In February and March 2016, a leadership course is being organized in flood based farming and rainwater harvesting. The objective of the leadership course is to contribute to nurturing development leaders with a good understanding of the bigger picture related to participatory approach to watershed management and climate change and variability. For more information and application see this [link](#).
- On December 7 Sindh Agriculture University Tandojam, Research and Development Foundation and Mehran University of Engineering and Technology Jamshoro, Sindh-Pakistan organized the National Conference on “Spate rrigation: Potential and Prospects”. The conference explored the most promising ways forward in spate irrigation. Read the [article](#) on the website of www.thenews.com.pk. Click [here](#) to view the presentations

Guidelines on spate irrigation



FAO GUIDELINES ON SPATE IRRIGATION

More detailed **Design** guidelines are
under preparation





**Spate Irrigation
Network**

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News & Recent Additions



Events

- o 15 September 2011: Summer course "Spate Irrigation and Water Management Under Drought and Water Scarcity" in Delft from 5 to 16 September 2011. [Read more...](#)



Highlights

- o Download the Overview Paper Spate Irrigation: [Spate Irrigation in the Horn of Africa: Status and Potential](#)

THE SPATE IRRIGATION NETWORK is a network of spate irrigation professionals and practitioners. The network stimulates the development of programmes of implementation that improve the livelihoods of those in spate irrigation areas, exchanges experiences and good practices, helps upgrade training, identify priority fields for improvement and research and



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ننڍن جي آبپاشي نظام وارن علائقن ۾ ننڍن فصلن جي پوک



Spate Irrigation
Network
Pakistan

Codifying Water Rules and Rights
(in Spate Irrigation)

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Practical Note Spate Irrigation



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Reducing Women's Work Load by
Electric Milk Churners

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