



EAfm Capacity Plus Module 2: Irrigation Systems

EAfm Capacity Plus training
Yangon, Myanmar- August 2019





Module objectives

- Learn...
- Recognize...
- Describe.....
- Discuss...

**Agriculture in Asia,
especially irrigation has a
major impact on water
and aquatic ecosystems**

Asia contains 70% of the
world's irrigated area
34% of cultivated land
in Asia is irrigated



Irrigation has increased crop productivity and improved national food security in many Asian countries

A wide-angle photograph of a vast, lush green rice field under a clear sky. In the foreground, six farmers are bent over, working in the rice. They are wearing colorful traditional clothing. In the background, a dense line of trees marks the horizon. The overall scene depicts a healthy and productive agricultural landscape.

Fundamental to reduction of extreme poverty in Asia

Fisheries in floodplains and rice systems are important for food and nutrition



Freshwater fish and other aquatic animals comprise important or even main source of animal protein

Systems design and operation with sole purpose of efficient water delivery for agricultural crops



...fish were not a consideration

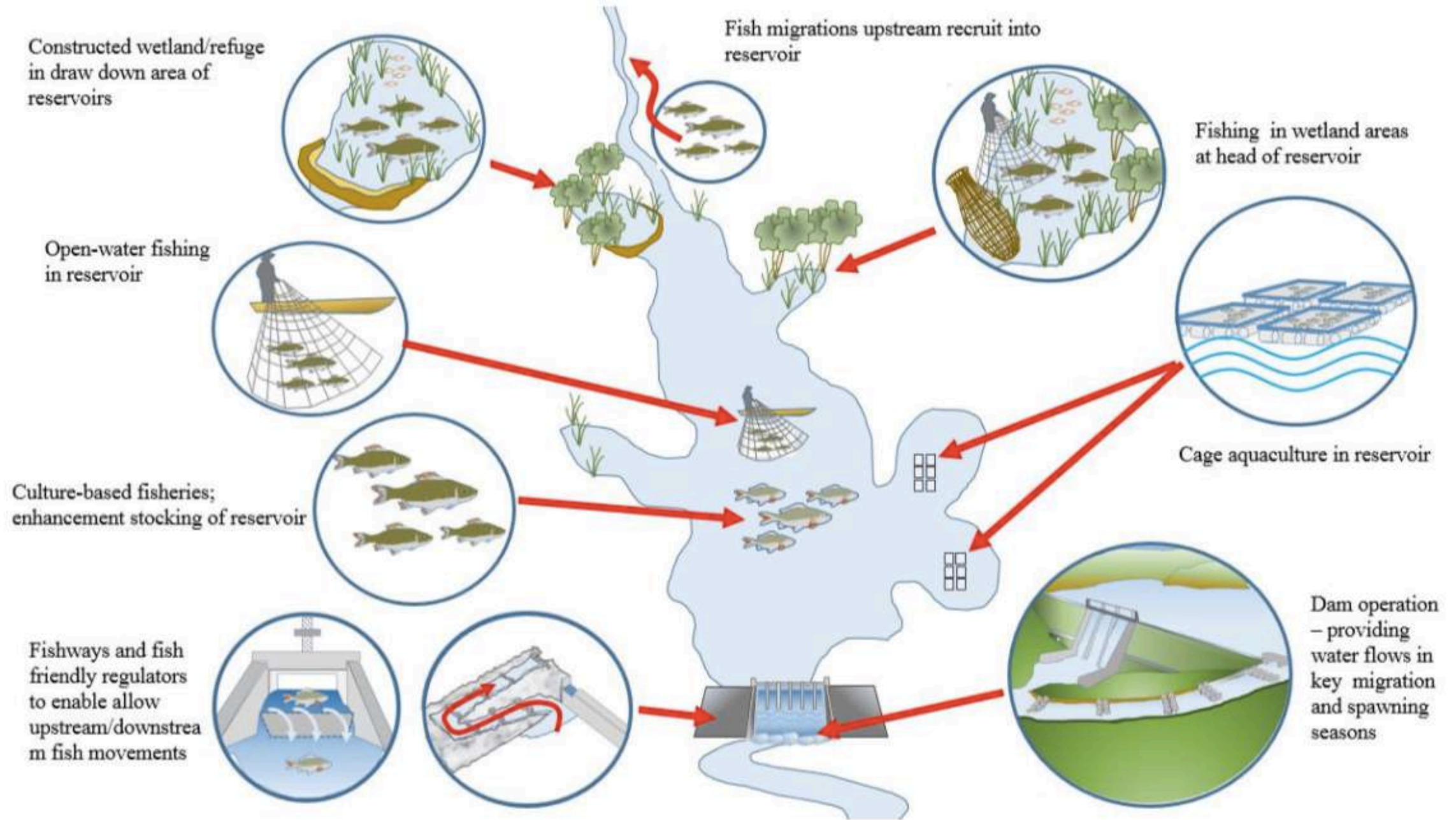


Figure 7: Opportunities for fisheries and aquaculture in the upper part (reservoir and headwaters) of the extended command area. (Graphic: Simon Funge-Smith)

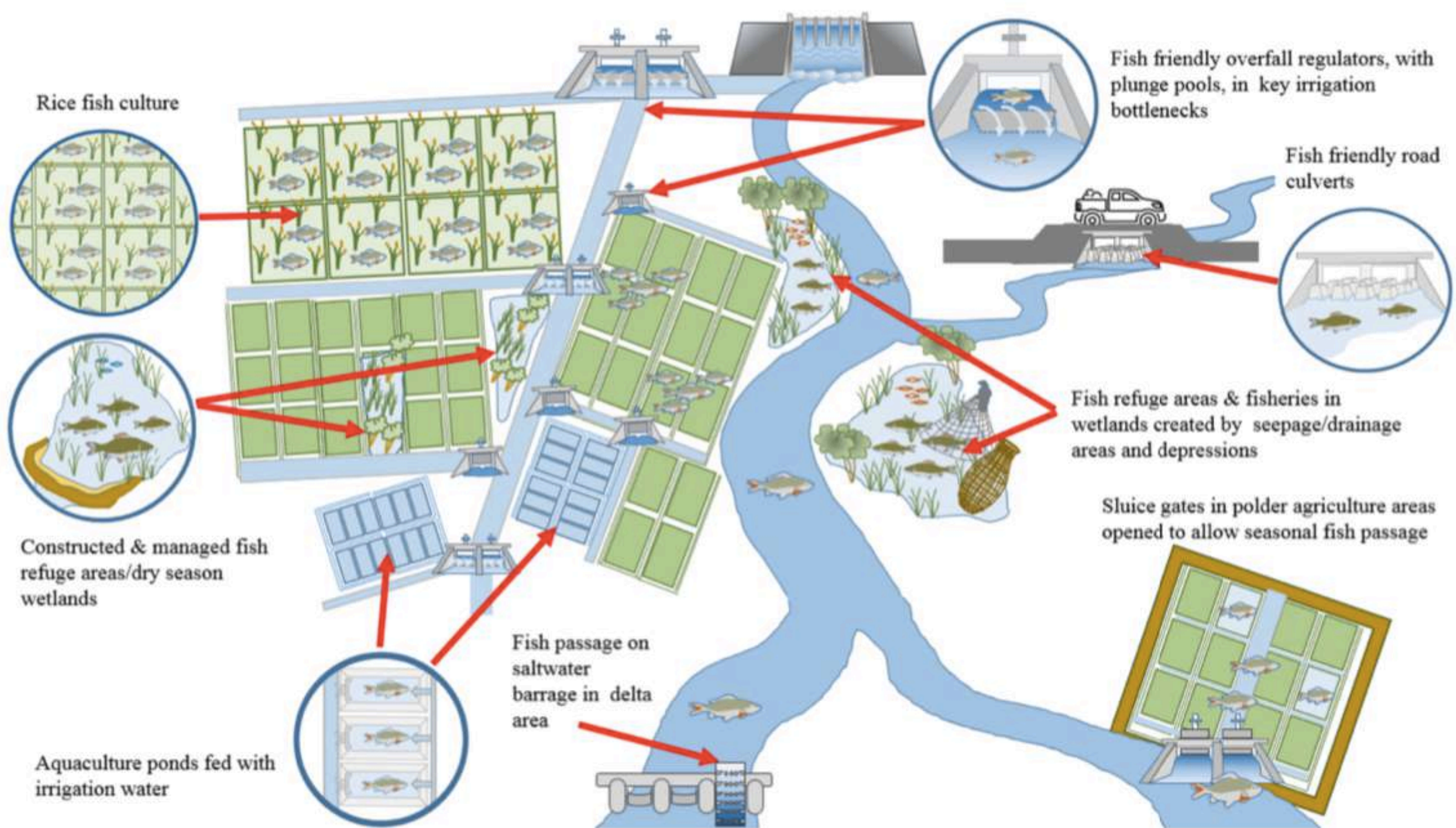


Figure 8: Fisheries and aquaculture integration into the lower part of the extended command area (water conveyancing and distribution system; the command area for irrigated crops; drainage system; associated natural or constructed wetlands and/or waterlogged areas). The water control structures in delta areas are includes (polder sluice gates and saltwater barrages). (Graphic: Simon Funge-Smith)

Irrigation Extended Command Area (ECA)



Storage - reservoir



Distribution canals
weirs, regulators



Waterlogged areas, wetlands

STORAGE

COMMAND AREA

DRAINAGE



Dam



Irrigated field crop



Drainage channels

Active fishing

Associated wetlands, ponds,
channels



Fixed gears

Target choke points in a system -
floodplain/irrigation system
drainage and next to irrigation
regulators





Ricefield fishery wide range of aquatic biodiversity, used for food

>230 species of fish, insects, crustaceans, molluscs, reptiles, amphibians...

...and plants!

Regulating water has wide ranging, typically negative impacts on aquatic ecosystems and their biodiversity

Some positive

Extension
of aquatic regimes

Creation of wetlands and
habitat

Mostly negative

Obstruction of fish
migration and water
connectivity

Changes to water flows and
the loss of natural habitat.

Disruption of connectivity



Structures block fish movement in the wet season as they move through a floodplain or upriver to spawn

Flow alteration

Changes in flow confuse fish

Upsets
biological/behavioural
cues

Rapid fluctuations may
leave them stranded



Physical damage

Fish passing regulators encounter:

- Rapid changes in barometric pressure and turbulent flows
- Physical strikes



Photographs: Garry Thorncraft, NUOL

+ve Creation of habitats and extension of wetlands




Reservoirs, wetlands in seepage and drainage areas



Irrigation systems and their reservoirs are **complex dynamic ecosystems.**

With the right management, **fish production can be increased**, benefiting nearby communities.

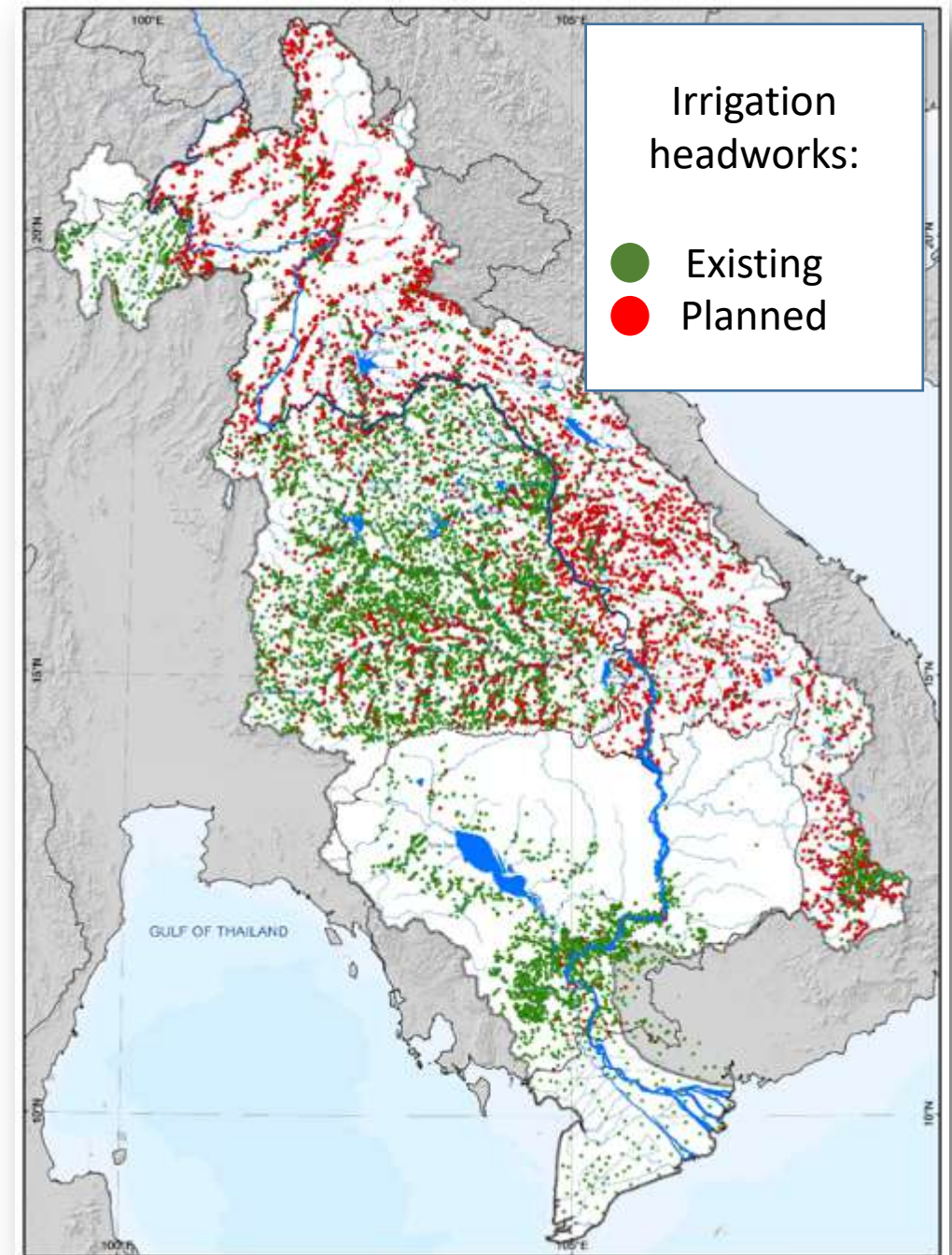


Irrigation developments are undergoing renovation
and rehabilitation ...and new/expanding systems

Once in 50 year opportunity to
restore some fisheries services

Upgrading or renovating irrigation systems to improve services for fish

Grey infrastructure and green solutions



Improving grey infrastructure

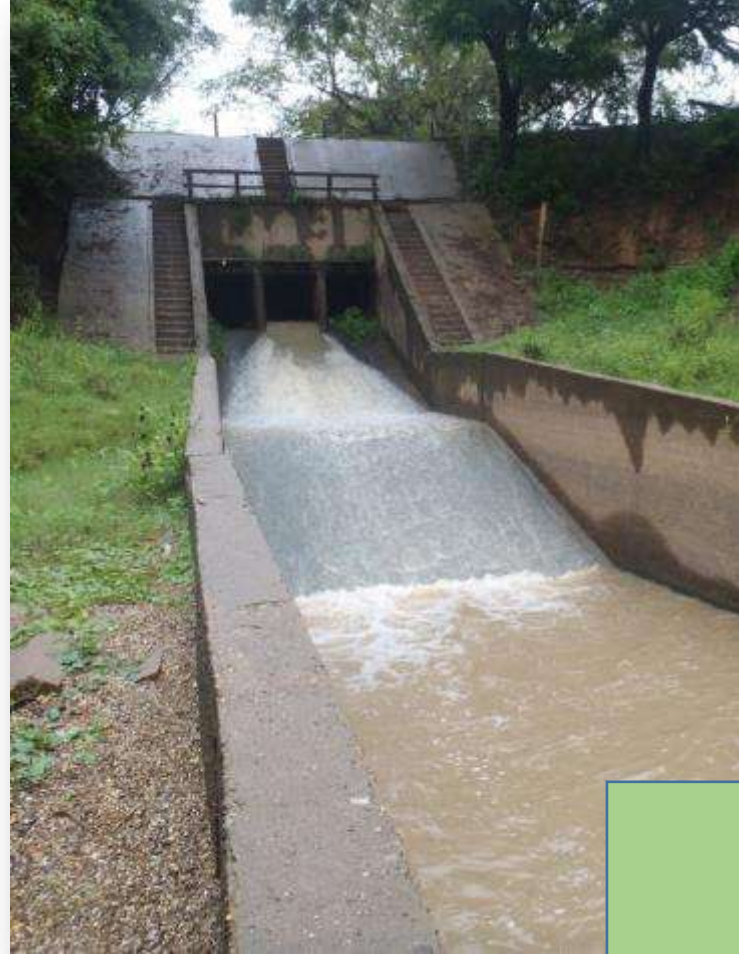


Successful low head tropical fishways, designed to maximize number of species passing (116 spp!)

Improving grey infrastructure

Undershot regulator and spillway - damages fish moving downstream

Conversion to fish friendly overshot sluices, with plunge pools



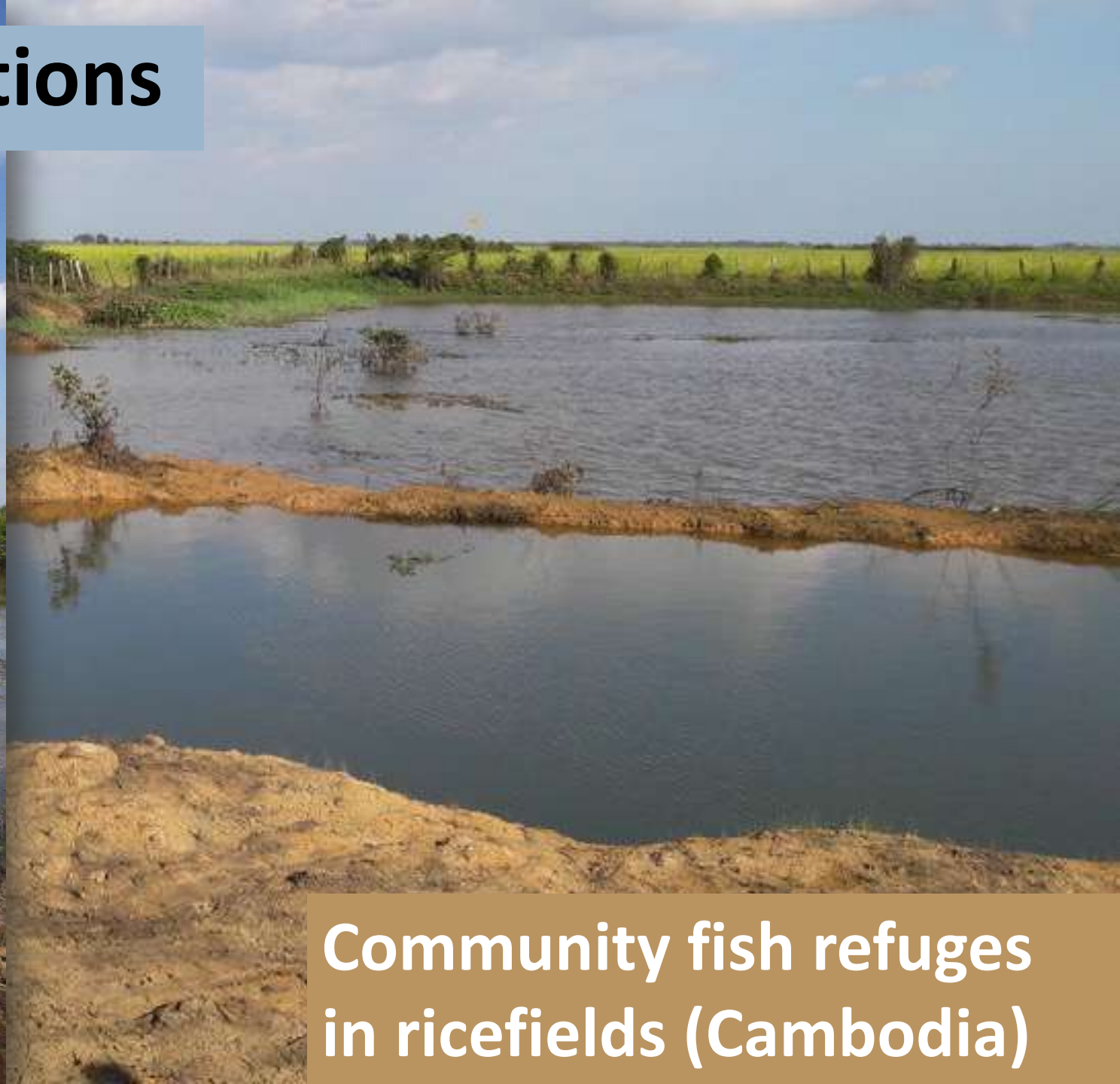
Photographs: Craig Boys, NSW

Promote 'green' solutions

Constructed wetlands
Rice-fish integration



Promote 'green' solutions



Community fish refuges
in ricefields (Cambodia)

Promote 'green' solutions

A landscape photograph showing a dry riverbed with a few pools of water. Several water buffalo are grazing on the dry, brownish ground and in the shallow water. The background features a hillside with sparse vegetation and a wooden fence line. The text 'Promote 'green' solutions' is overlaid in the top left corner.

Restore riparian habitat

Promote 'green' solutions

**Traditional
ricefield fish
refuge/traps
(Lao PDR)**



Photographs: Nick Innes-Taylor

Develop fisheries in reservoirs and irrigation tanks



Stock enhancement and
culture based fisheries

Integrating aquaculture



Aquaculture can be treated as an irrigation field crop

Requires policy on water allocation agreement/payments

Integrating aquaculture

Cage culture in rivers

Reservoirs

Agreement on
drawdown levels

A photograph of a concrete structure, possibly a culvert or a small tunnel entrance, partially buried in dry, rocky soil. The structure is a rectangular block of concrete with a large circular opening on its right side. The surrounding soil is light brown and composed of small rocks and clumps of dirt. The text is overlaid on the top left of the image.

“Technical” interventions are not magic bullets and cannot stand alone

Address weak linkage between irrigation modernization and fisheries

Departmental and local levels

Combine with irrigation operation and management with community strengthening

Governance challenges

Fisheries weaker than Water User Groups

Policies and regulations often constrain integration (Myanmar!)

Access and tenure to water bodies

Monopolization and elite capture of water bodies

Unclear rights over stocked fish

Cost recovery of water for aquaculture?



Recommendations:

- Raise awareness and develop proactive policy for (re-) integration of fish into irrigation
- Highlight potential to enhance aquatic biodiversity, ecosystem services, resilient and diversified livelihoods (particularly nutrition)
- Document costs, practical achievements (and problems) to support this

A person is sitting on a small, narrow boat on a river. The boat has a small, rectangular structure on it. The water is calm and the background is a hazy, overcast sky.

Recommendations:

- Improve coordination between Irrigation and Fishery/NRM/environment
 - Build technical capacity to support and implement fishery integration into irrigation modernization
 - Incorporate fishery integration into irrigation lending
 - Strengthen capacity of fishers groups
 - Use an Ecosystem Approach to Fisheries to facilitate this
- 
- A person is sitting on a small, narrow boat on a river. The boat has a small, rectangular structure on it. The water is calm and the background is a hazy, overcast sky.

Key messages

Discussion

- Myanmar's current irrigation laws do not allow for reservoirs or irrigation infrastructure to be used for capture fisheries or aquaculture purposes.
 - Is this a lost opportunity for the fisheries sector?
 - How could DoF and other agencies engage with the Irrigation Department to bring about governance reform?

