Food and Agriculture Organization of the United Nations

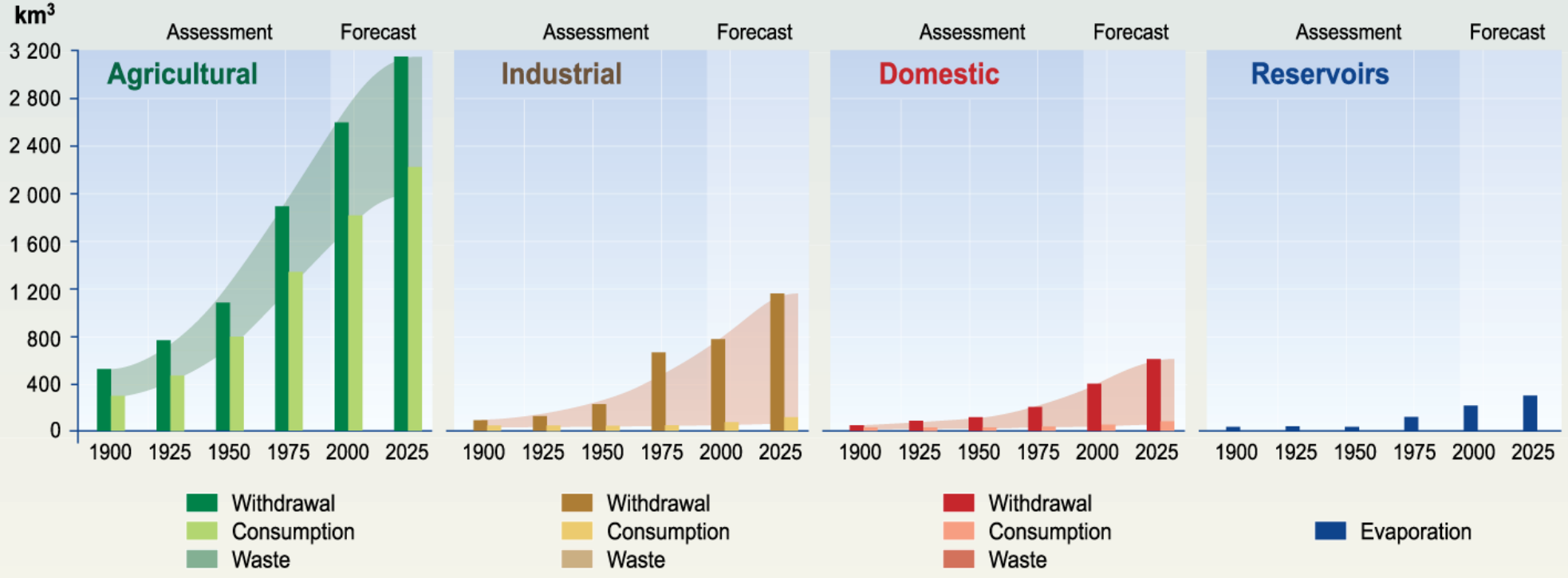
FAO Discussion Paper

Nature-Based Solutions at the service of agricultural water management & food security

Amani Alfarra, Ph.D.
Water Resource Officer
Land and Water Division
Climate, Bio diversity Land and Water Department
June 28, 2018

Food and Agriculture Organization of the United Nations

Global Water Demand



UNEP

Note: Domestic water consumption in developed countries (500-800 litres per person per day) is about six times greater than in developing countries (60-150 litres per person per day).

PHILIPPE REKACEWICZ
FEBRUARY 2002

Food and Agriculture Organization of the United Nations

Agricultural Water Demand

Agriculture is responsible for an average of

70 %

of water withdrawals from surface and groundwater sources worldwide

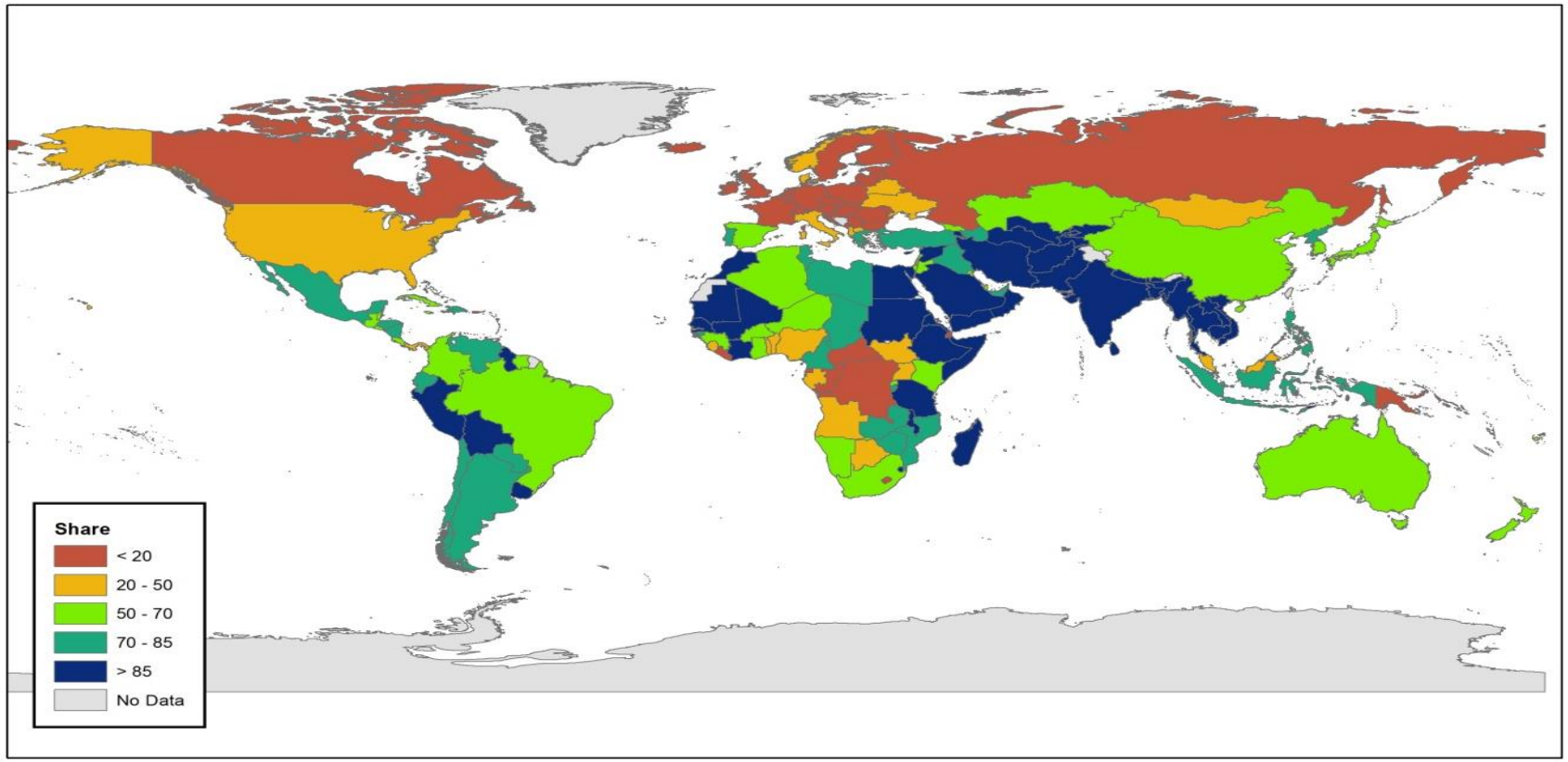
That leaves 30 % for everything else:

- Domestic
- Industries
- Electricity
- Environment

Source: Adapted from www.ceres.org/FoodWaterRisk

Food and Agriculture Organization of the United Nations

Water scarcity: a global issue



Share of agricultural water demand over total water demand.

Source: FAO, Land and Water Division, 2018.

Food and Agriculture Organization of the United Nations

Why NBS in agricultural water management?

- FAO discussion paper analyzes NBS in the agricultural water management sector;
- Demand for food will increase exponentially and climate change is expected to increase; and
- Alternative solutions are needed: NBS can contribute to enhancing water quality and availability.

Food and Agriculture Organization of the United Nations

What is NBS?

- In principle, NBS mimics natural processes and builds on fully operational water-land management concepts that aim to simultaneously improve water availability and quality and raise agricultural productivity;
- No straightforward distinction between NBS and other human induced management of ecosystem services.
- More than one definition and interpretation of NBS exists;

Food and Agriculture Organization of the United Nations

Definitions

- ***Ecohydrology*** is defined as an integrative science that focuses on the interaction between hydrology and biota. It aims at reinforcing ecosystem services in modified landscapes while reducing anthropogenic effects. It utilizes the watershed as a basic unit for planning and incorporates the concept of improved ecosystem resilience as a management tool. Ecohydrology accentuates the importance of the incorporation of eco-tecnological measures that complement standard engineering approaches.
- ***The Ecosystem Approach*** is a conceptual framework for resolving ecosystem issues, adopted by the Convention on Biological Diversity. This approach focuses on the integrated management of land, water and living resources with the aim of promoting the conservation and sustainable use in an equitable manner. It encompasses the application of adequate scientific methodologies specific to biological organization including its essential processes, functions and interactions among organisms and their environment. In addition, it embodies the human aspect thus considering human diversity as an integral component of the ecosystem.
- ***The Wise Use of Wetlands*** has been defined by the Ramsar Convention on Wetlands as “the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development”.
- ***Ecosystem-Based management*** focus on the conservation, sustainable management and restoration of ecosystems. This approach recognizes the vast array of interactions within an ecosystem, involving humans. It considers resource trade-offs to protect and sustain diverse and productive ecosystems and services they provide.
- ***Environmental Flows*** consider the management of the quantity, timing, and quality of water flows below a dam, with the aim of sustaining freshwater and estuarine ecosystems and the human livelihoods that depend on them. Green Infrastructure is a strategically planned network of natural and semi-natural areas that are specifically designed to deliver a wide range of ecosystem services from water purification to climate change to recreation. These spaces provides opportunities for green jobs and enhance biodiversity.
- ***Green infrastructure*** provide environmental, economic and social benefits through natural solutions and help reduce the dependence on grey infrastructure.
- ***Ecological Engineering*** is defined as the design of ecosystems for the mutual benefit of humans and nature. It involves the restoration of ecosystems that have been disturbed by human activities and the development of new sustainable ecosystems comprising both human and ecological values.
- ***Agroecology*** has been defined as “the application of ecological science to the study, design and management of sustainable agriculture”. Its objective is to create diversified agroecosystems that mimic natural systems as closely as possible to enhance sustainable production and self-reliance.
- ***Ecosystem Services*** are “the benefits obtained from ecosystems” and generally categorized as: 1) Provisioning services, 2) Regulating services, 3) Habitat services, 4) Cultural and amenity services. Agriculture relies on critical ecosystem services such as pollination, pest control and soil fertility to produce provisioning services (e.g. food, fibre and fuel), and can also contribute to regulating ecosystem services such as carbon sequestration and water purification.
- ***Payment for Ecosystem Services*** is a tool for achieving ecosystem conservation while improving the livelihoods of farmers as environmental service providers.
- ***Globally Important Agricultural Heritage Systems:*** are landscapes formed through a remarkable process of coevolution of humankind and nature, they combine agricultural biodiversity, resilient ecosystems and a valuable cultural heritage. Moreover, they sustainably provide multiple goods and services, food and livelihood security for millions of small-scale farmers. These sites have emerged over centuries of cultural and biological interactions and synergies, representing the accumulated experiences of rural people. Ecosystem Based Adaptation (EBA) is an approach that uses biodiversity and ecosystem services as an entry point for the development of overall adaptation strategies to climate change. The Ecosystem Based Adaptation (EBA) in agricultural sectors includes the sustainable management, conservation and restoration of agriculture, forestry and fishery related ecosystems to provide services that help people adapt to the adverse effects of climate change.
- ***Ecosystem Based Adaptation (EBA)*** can be cost effective, generate social, economic and cultural co-benefits, and contribute to the conservation of biodiversity, overall ecosystem health and sustainable natural resources management. Ecosystems either aquatic, inland, coastal and marine provide humans with resources for recreation, food and livelihoods. They perform environmental functions that contribute to human well-being.

Food and Agriculture Organization of the United Nations

Is NBS – a new paradigm for water management ?

Food and Agriculture Organization of the United Nations

Types of NBS

NBS TYPOLOGY	
Type 1	No or minimal intervention in ecosystems; maintains or improves delivery of eco-services of preserved ecosystems. This NBS incorporates areas where people live and work in a sustainable way including nature conservation and national parks.
Type 2	Interventions that develop sustainable and multi-functional ecosystems and landscapes that improve delivery of selected eco-services. This type of NBS is strongly connected to benefitting from natural systems agriculture and conserving the agro-ecology.
Type 3	Manages ecosystems in intrusive ways and includes full restoration of degraded or polluted areas using grey infrastructures.

Food and Agriculture Organization of the United Nations

Things to consider

- Typologies are not static but dynamic representation;
- Many NBS examples cover more than one typology;
- NBS term also recognizes the value of regulations and customary laws of indigenous people.

Food and Agriculture Organization of the United Nations

NBS and agricultural management

- Water is an important ecosystem service to both agriculture and food security;
- Understanding underlying mechanisms of an ecosystem and its influence over water availability in quantity and volume for agriculture and food security provides guidelines for targeted NBS interventions;
- 21 case studies were selected and analyzed on NBS interventions, some were “success” and “failure” experiences.

Food and Agriculture Organization of the United Nations

NBS and the SDGS

Food and Agriculture Organization of the United Nations

Conclusions

- We are not claiming that NBS is the panacea but it can be an important contribution to upcoming water resources challenges in the agriculture sector;
- Case studies assessed confirmed that there are certain requirements to be met for an NBS-type intervention to be successful (i.e. collective action, stakeholder involvement, creating and organizing funds, institutional collaboration);
- NBS require investments and studies show that NBS-interventions are economically feasible and efficient;
- Valuation of ecosystem services is sometimes difficult and incomplete.

Food and Agriculture Organization of the United Nations

What are your thoughts on NBS in agricultural water management?

Food and Agriculture Organization of the United Nations

THANK YOU!