

NATIONAL STRATEGIES

FOR USE OF POOR QUALITY WATER RESOURCES IN AGRICULTURE

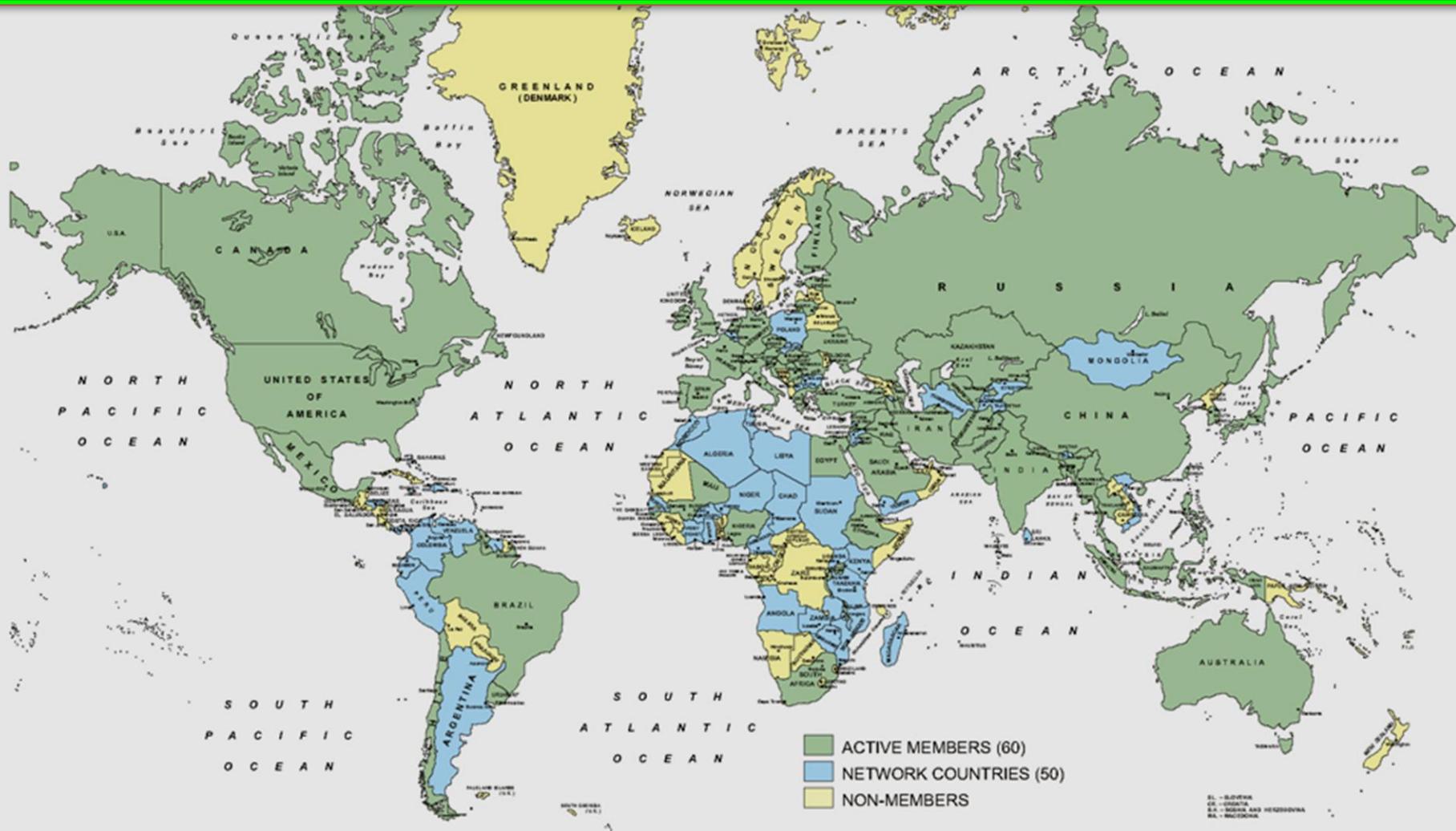
AVINASH C TYAGI
SECRETARY GENERAL, ICID

5th Regional Workshop, Southeast and Eastern Asia
Safe and Productive use of Wastewater in Agriculture,

5-7 March, 2013, BALI, Indonesia
Under the Auspices of UN-Water
Partners: UNW-DPC, FAO, UNEP, WHO, ICID and IWMI



ICID Membership network spreads over 100 countries covering about 96% of the world's irrigated area



The Millennium Development Goals

1



ERADICATE
EXTREME POVERTY
AND HUNGER

2



ACHIEVE UNIVERSAL
PRIMARY EDUCATION

3



PROMOTE GENDER
EQUALITY AND
EMPOWER WOMEN

4



REDUCE
CHILD MORTALITY

5



IMPROVE MATERNAL
HEALTH

6



COMBAT HIV/AIDS,
MALARIA AND OTHER
DISEASES

7



ENSURE
ENVIRONMENTAL
SUSTAINABILITY

8



GLOBAL
PARTNERSHIP FOR
DEVELOPMENT



Building the Future we want



RIO+20

United Nations
Conference on
Sustainable
Development

June 2012, RIO de Janerio, Brazil

The Future We Want

Green economy in the context of SD and poverty eradication

- ▣ Apply green economy policies in advancing **sustainable development** and ending poverty
- ▣ Recognize the importance of linking financing, technology, capacity-building and national needs for SD policies and green economy

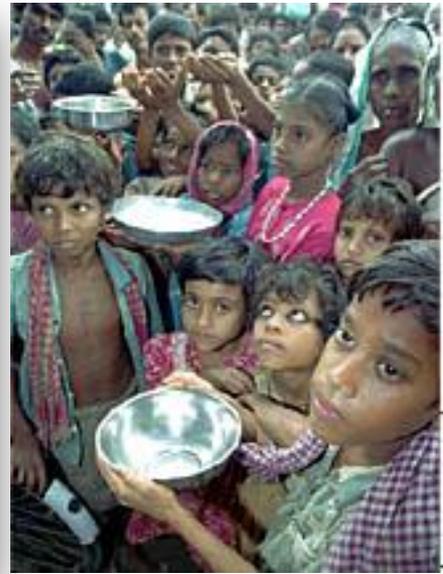


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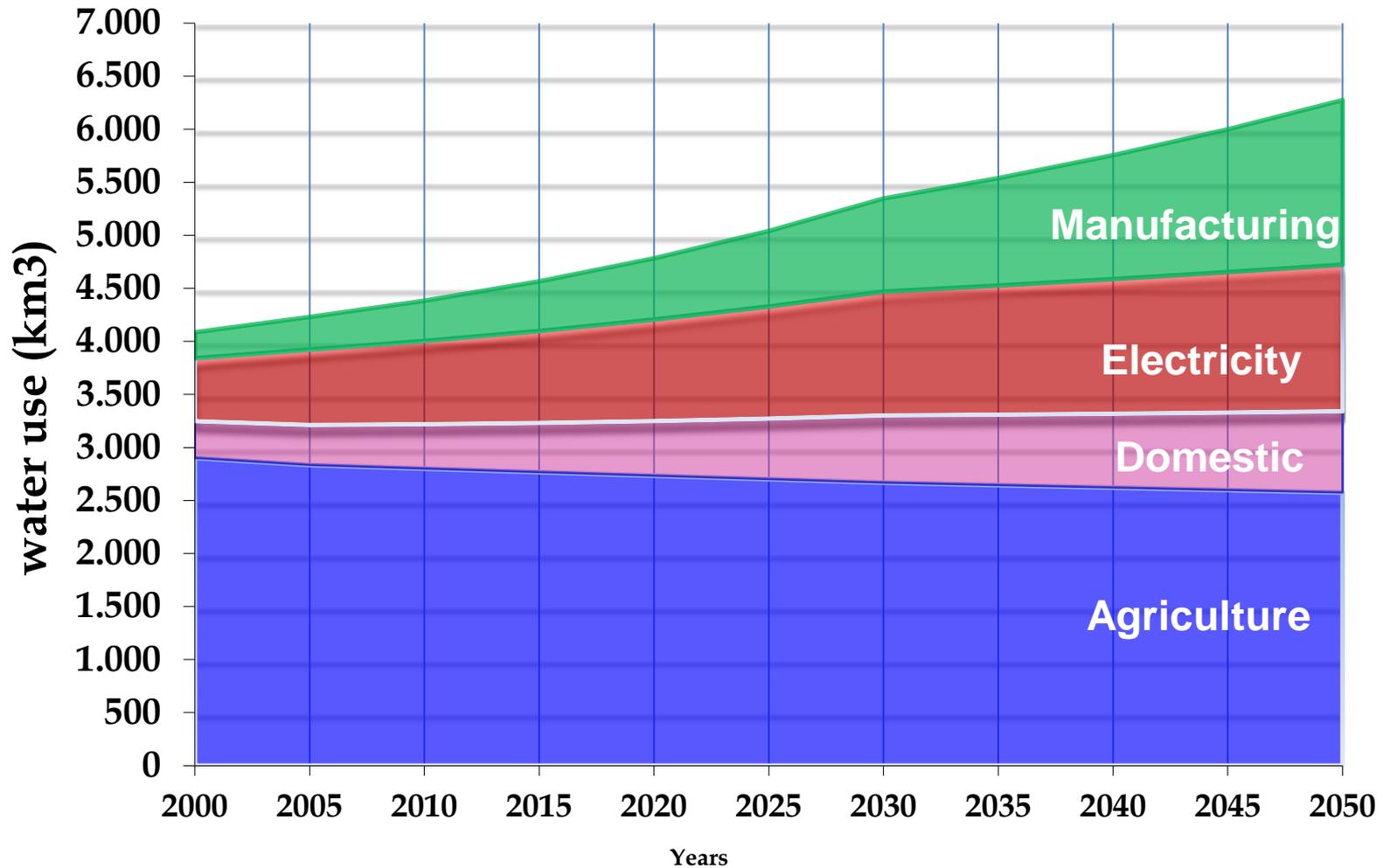
World agriculture faces an enormous challenge over the next 40 years to produce almost 50% more food up to 2030 and double the food production by 2050



Key drivers

- Increasing population and urbanization
- Changing diets
- Rapidly growing water demand from industrial/ energy and domestic sectors
- Increasing area under bio-energy crops
- Climate change impacts
- Increasing fresh water scarcity

Global freshwater use: projections



Source: OECD Environmental Outlook baseline (2008)



Poor Quality Water

- Saline water,
- Brackish groundwater,
- Wastewater

Saline water can be used to produce food and fodder. Some varieties of tomato, Sugar beet, barley, Bermuda grass are salt tolerant.



Fresh tomatoes, Syria



barley genotypes, Dubai



Cherie tomatoes, Malaga, Spain



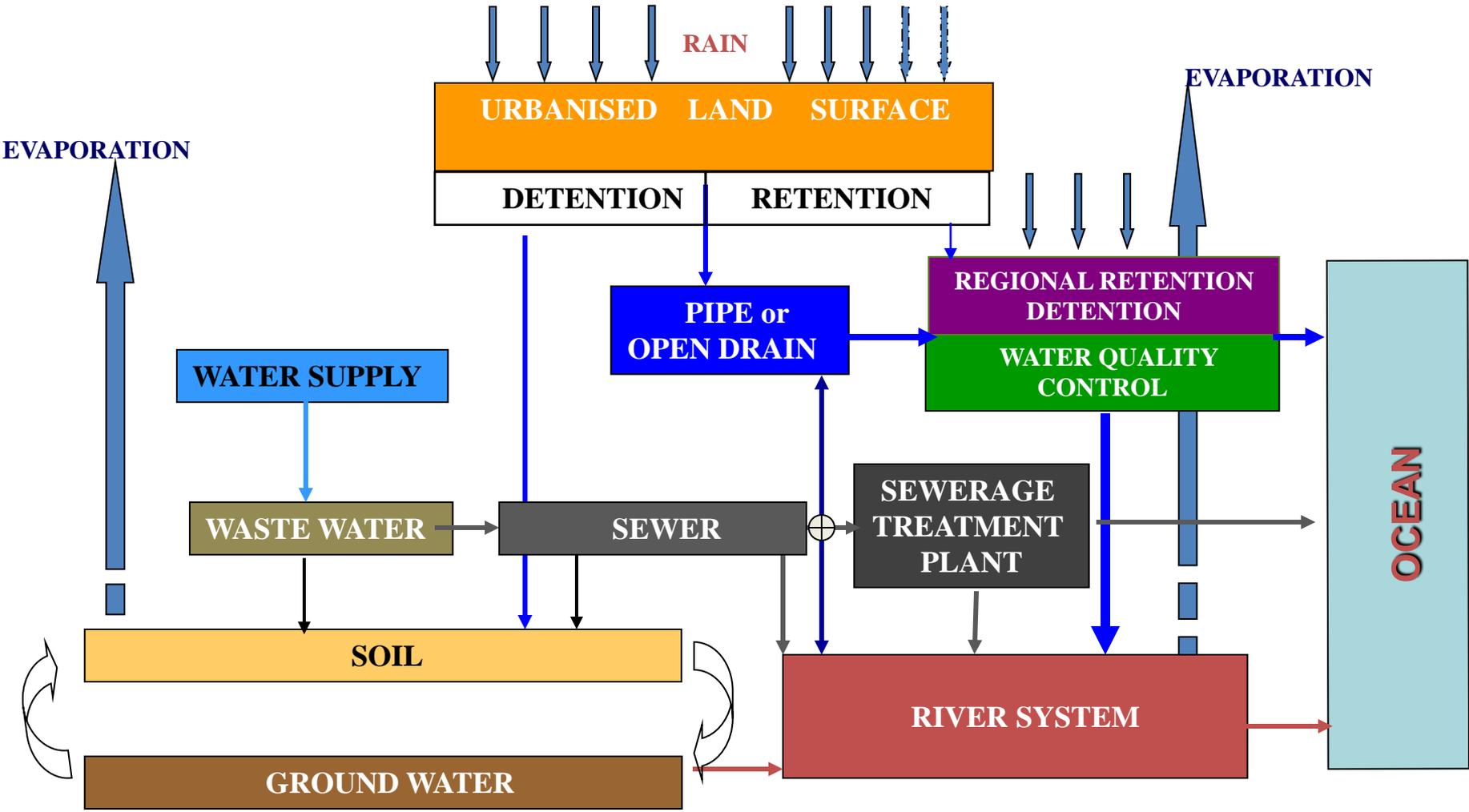
pearl millet, Dubai



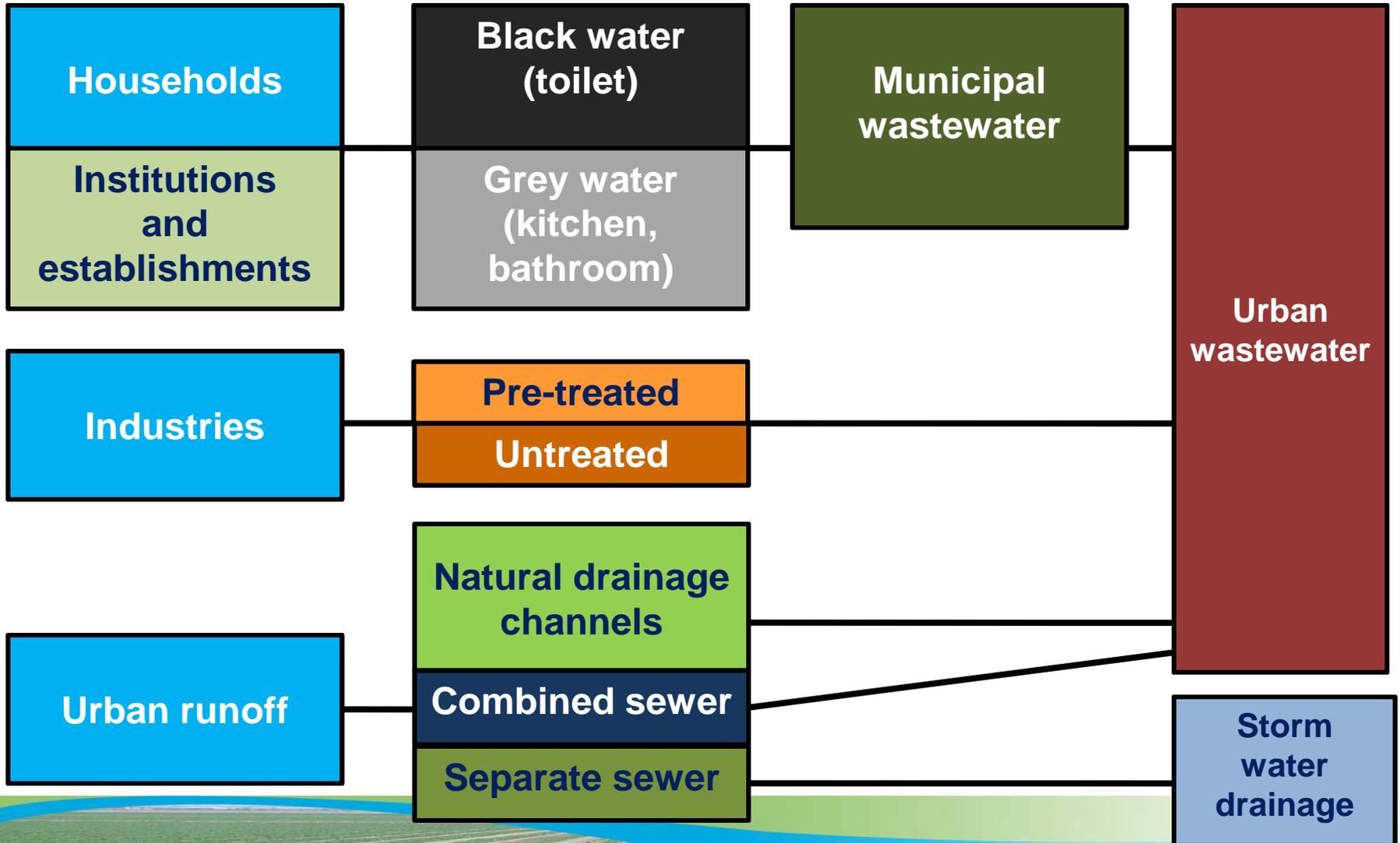
Halophyte shrub *Atriplex*, Dubai



Urban hydrologic cycle



Urban wastewater generation



Grey water

- ▣ Grey water is all of the wastewater that drains out of washing machine, sinks and bathtub or shower; everything coming out of households except the toilet water.
- ▣ Separating grey water from black water and tapping its reuse potential could be an ideal strategy for urban wastewater management
- ▣ Grey water availability
- ▣ Land area suitable for irrigation garden plants
- ▣ Identification of right kind of plants etc.
- ▣ Regulations: municipal bye-laws



Agriculture wastewater

- ▣ **Non-point Source Pollution:** Sediment, Pesticide, Nutrient run-off
- ▣ **Point Source Pollution:** Animal waste, piggery waste, silage liquor, daily farming waste, slaughtering waste, vegetable washing

AND

Industrial wastewater

- ▣ Including biological waste from hospitals



Why bother about wastewater?

- ❑ Wastewater (raw, diluted or treated) is a resource of increasing global importance, particularly in urban and peri-urban areas due to **growing wastewater volumes**
- ❑ Without proper management, wastewater use poses **serious risks to human health and the environment**
- ❑ With proper management, wastewater use can contribute significantly to **sustaining livelihoods**, food security and the quality of the environment
- ❑ Wastewater already **irrigates approximately 49 million acres** of cropland, and
- ❑ **10 percent of the world's population would starve** if they didn't have access to food grown that way



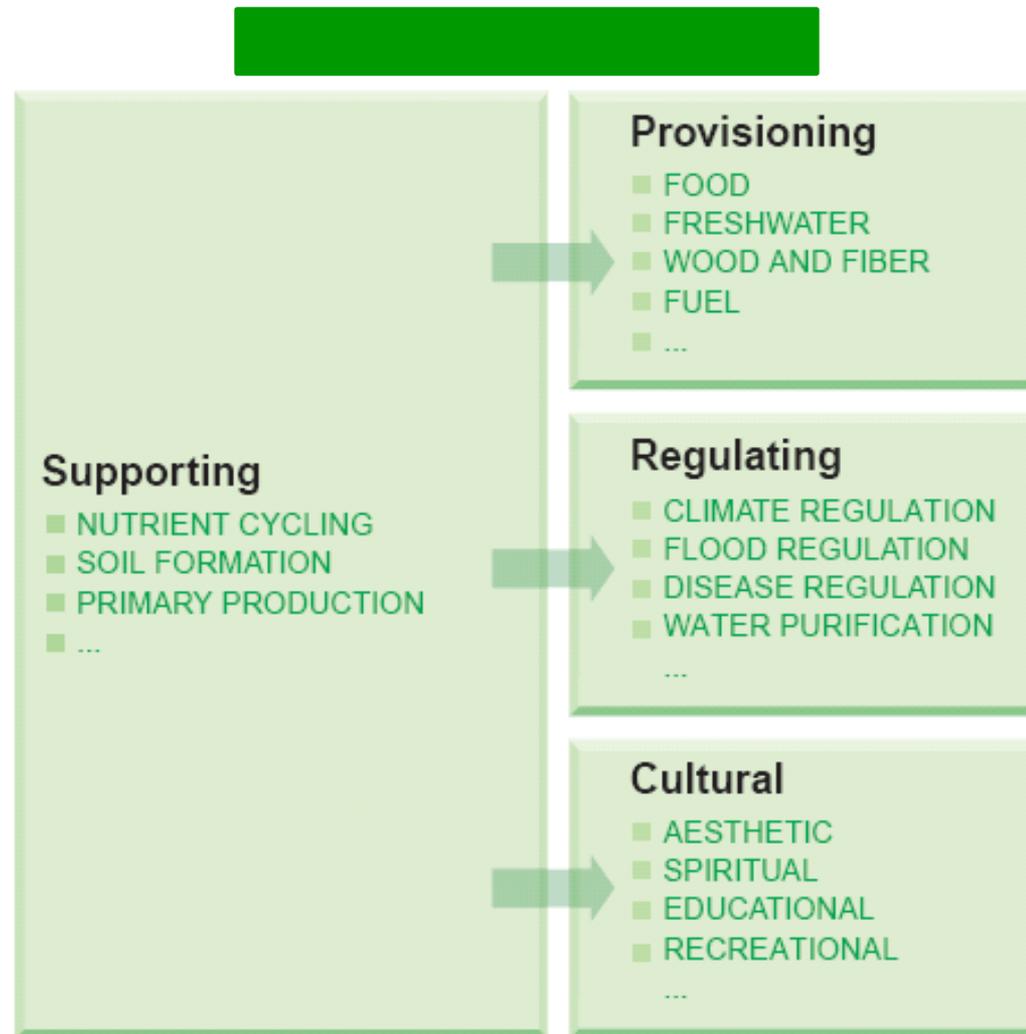
Why bother about wastewater?

- ❑ In majority of the urban areas, the activities in the wastewater sector are focused mostly on wastewater disposal than recycle and reuse recycle
- ❑ benefits of wastewater farming far outweigh the drawbacks
- ❑ reuse of wastewater has **not received much attention by the policy-decision makers** perhaps because of the lack of viable models with necessary research and technology support,
- ❑ strong policies and legal framework at the national and state levels and sufficient trained manpower in the urban local bodies are required.



Ecosystem Services

Unregulated discharge of wastewater undermines biological diversity, natural resilience and the capacity of the planet to provide fundamental ecosystem services, impacting both rural and urban populations and affecting sectors from health, industry, agriculture, fisheries and tourism



Benefits of wastewater use?

▣ Direct benefits

- Recycles and thereby conserve water,
- Recycles nutrients, thereby reducing the need for farmers to invest in chemical fertilizer, and
- Provides a reliable water supply to farmers particularly in low-income dry areas;

▣ Indirect benefits

- Prevents of pollution of rivers, canals and other surface water that would otherwise be used for the disposal of the wastewater, and
- Disposes municipal wastewater in a low cost and hygienic way.



National Water Policy

- ▣ **Objective:** “...to meet all the needs of water: drinking agriculture, hydropower, ecological.....”
- ▣ **Recognize:**
 - “ ... the various available water sources are distributed in time and space which do not match the demand and sets out ways and means to harness all available sources.....”.
 - “ ... the need to recycle and reuse....”
- ▣ **But often fail to:**
 - Include wastewater in their water budgets
 - Recognize the intricacies of urban hydrologic cycle
 - Set up institutions that cross-over the boundaries of waste water management in urban setting and irrigation management



Environment Management Policies

- ▣ **Objective:** “...to meet ecological requirements related to water: drinking agriculture, hydropower, ecological.....”
- ▣ **Recognize:**
 - “ ... the quality of water resources as an essential element to meet the needs of environmental services”.
 - “ ... the disposal and treatment of wastewater....”
- ▣ **But often fail to:**
 - Regulate the wastewater disposal to water bodies



Inter-relations with floods

- ▣ Peri-urban areas are generally the users of wastewater
- ▣ These areas are habited by the most vulnerable sections of society and being adjunct to rivers, low lying are **exposed to frequent flooding**
- ▣ As receptor of flood waters they have the potential to **spread the contaminated wastewater** used for irrigation to the downstream areas.



Disaster Management Plans

- ▣ **Objective:** “...to reduce the adverse impacts of extreme events such as droughts and floods (for example).....”
- ▣ **Recognize:**
 - “ ... the risk (floods or drought) assessment as a means to take preventive and prepare post disaster preparedness plans.....”.
 - “ ”
- ▣ **But often fail to:**
 - Assess health risks, particularly due to flooding of wastewater treatment plants and wastewater agriculture fields



National Health Policy

- ▣ **Objective:** “...to achieve an acceptable standard of good health amongst the general population of the country.....”
- ▣ **Recognize:**
 - “ ...that the ambient environmental conditions are a significant determinant of the health risks to which a community is exposed; such as unsafe drinking water, unhygienic sanitation and air pollution significantly contribute to the burden of disease, particularly in urban settings” .
 - “ that the work conditions in several sectors of employment can be sub-standard effecting the health of the workers...”



Health exposure

- ▣ **Farm workers:** Contact with wastewater
- ▣ **Consumers:** Use of products, Vegetables and salads eaten uncooked, Sports fields and public parks
 - Since so much produce moves around the world, there is always the possibility of being exposed to produce irrigated with wastewater,
- ▣ **Nearby communities:** Spread of polluted top soil; Entry of aerosols in atmosphere; flooding



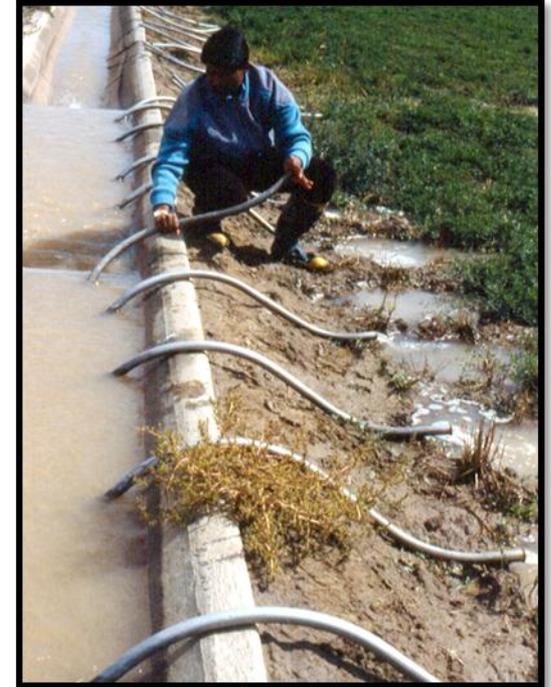
Strategies for managing health risks

- ▣ Waste treatment
- ▣ Crop restriction
- ▣ Appropriate irrigation techniques
- ▣ Human exposure control
- ▣ Chemotherapy and vaccination
- ▣ As the short-term benefits of wastewater irrigation could be offset by the long-term health and environmental impacts more research is needed



Is there need for a policy?

- ▣ Is there a need for wastewater reuse?
- ▣ What are the drivers of wastewater reuse?
- ▣ Wastewater as a viable new resource?
- ▣ What is the magnitude of the wastewater problem?
- ▣ How is urban water collected?
- ▣ Is there a separation of grey and black water collection systems?



Policy elements

- ▣ What are the objectives? And how to achieve the objectives?
- ▣ Will we use treated, partially treated, diluted or raw wastewater?
- ▣ How do we manage health risks, nutrient and land management?
- ▣ What are the economic considerations?
- ▣ Is it socio-culturally acceptable? If not, how to make it acceptable?
- ▣ How to get the institutions work together?
- ▣ What regulatory mechanism has to be put in place?



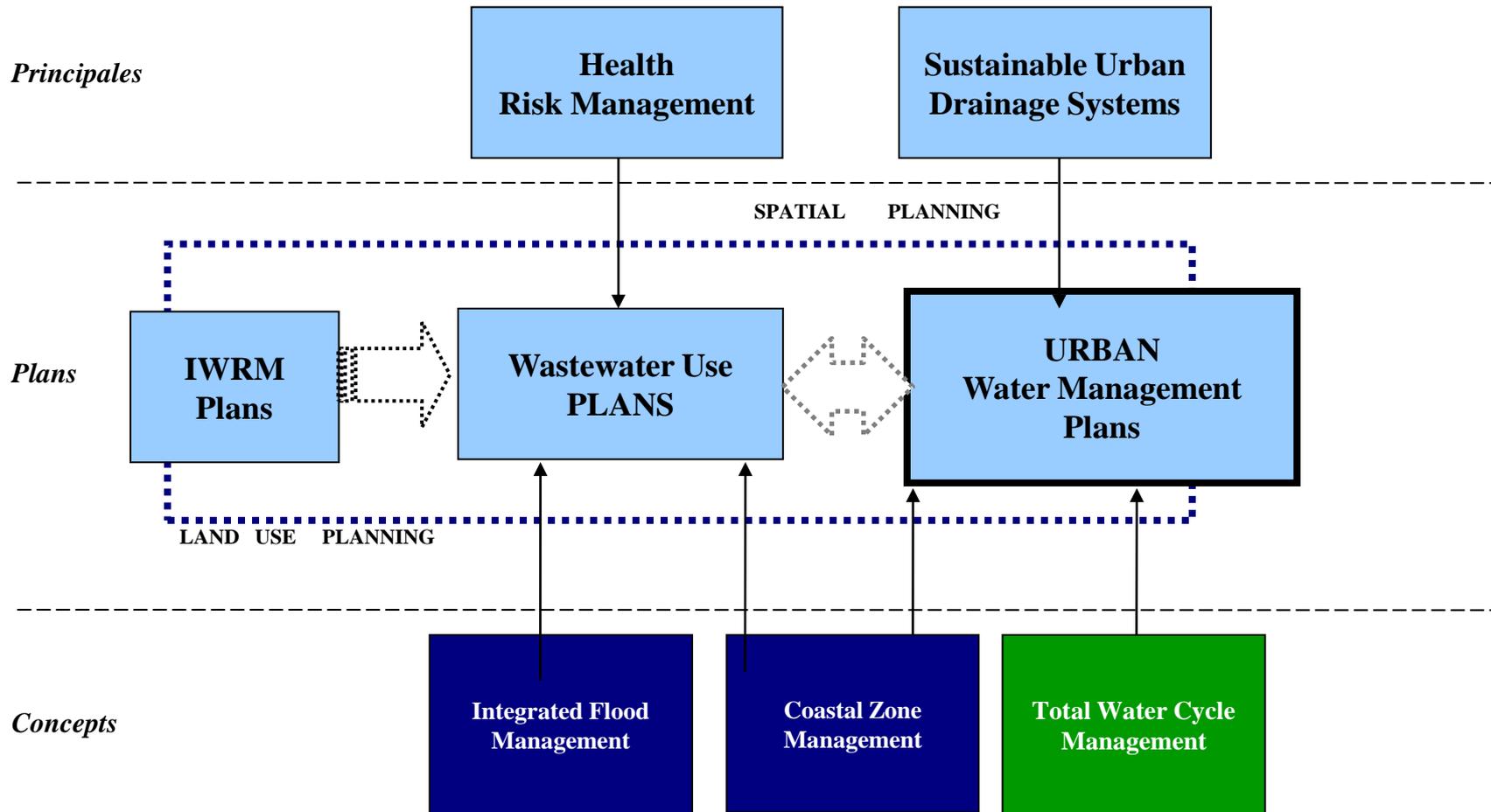
Economics of wastewater

- ▣ **Source of water:** provides water at little additional cost
- ▣ **Source of nutrients:** saves fertilizers
- ▣ **Eco-services:** saves costs of treatment to the acceptable standards and
- ▣ **Health risk management:** Preventive health measures have a cost
- ▣ **Equity:** many wastewater irrigators are not landless farmers, that rent small plots for income-generation
- ▣ Opportunity cost

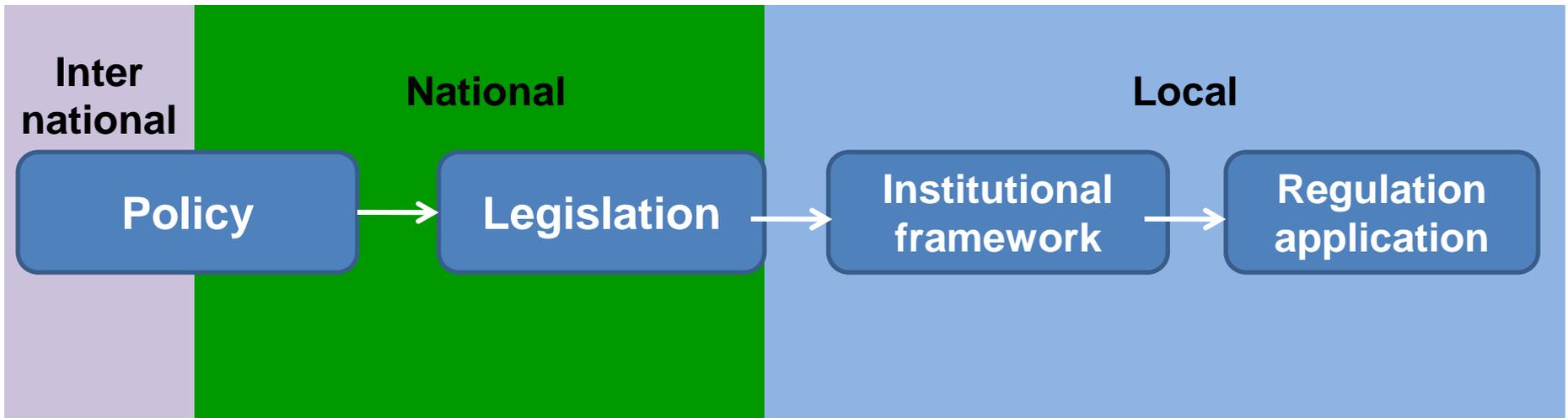
Stopping or over-regulating these practices could remove the only income many landless people have



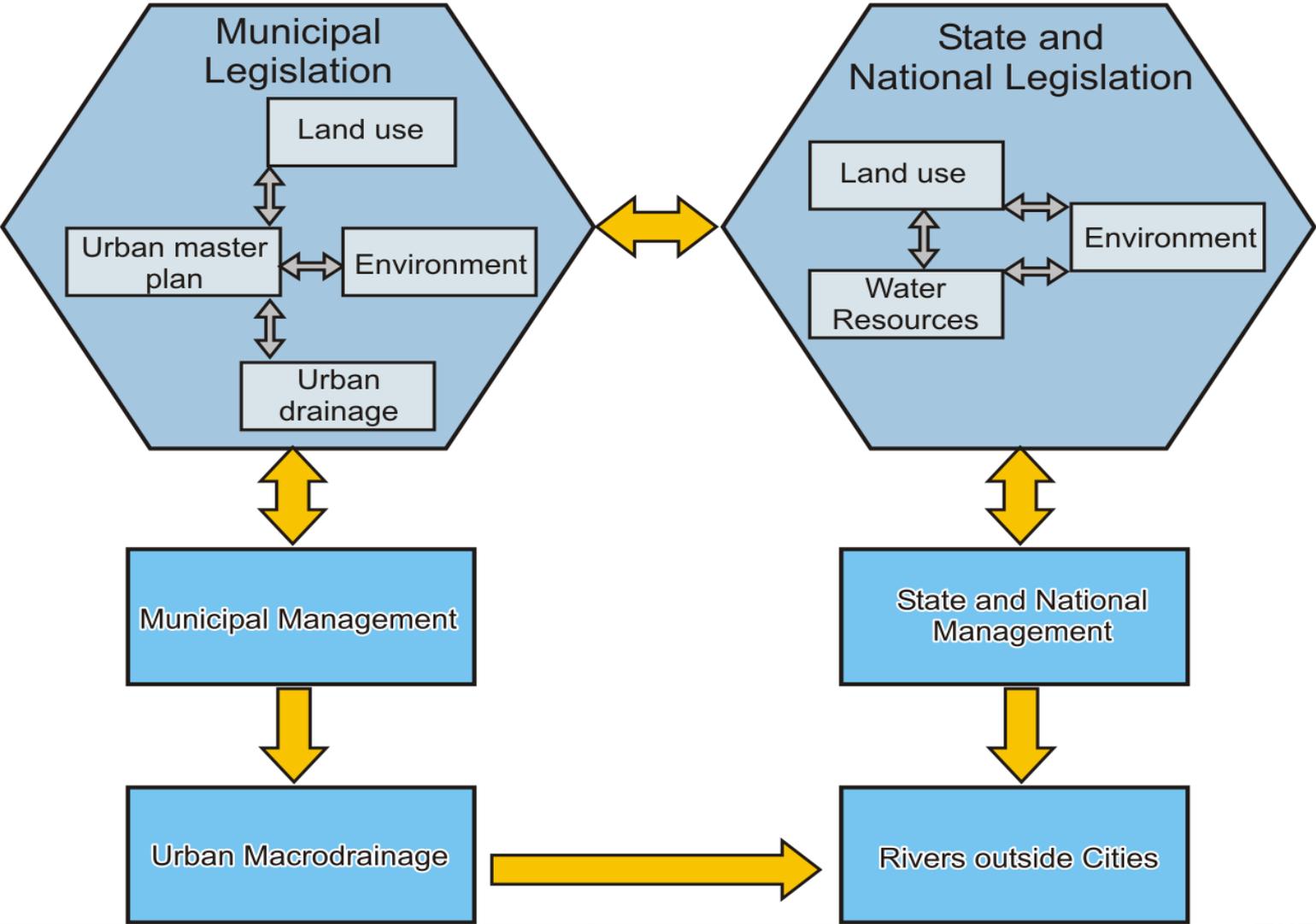
Integration of policies



Policy Framework



Legal and Institutional Framework



ICID: working groups

- ▣ **Working Group on Environment (WG-ENV)**
- ▣ Mandated to:
 - Provide guidance on the environmental aspects of drainage and irrigation systems
 - Management of sustainable environment
 - Maximising positive and minimizing negative aspects of irrigation and drainage
- ▣ **Working Group on use of poor quality water (including wastewater) in irrigation (WG-PQW)**
- ▣ Mandated to:
 - Promote safe management of poor quality water
 - Consider the required institutional and legislative aspects



Conclusions....

- ▣ National policies and strategies are essential
- ▣ National platform for wastewater use in agriculture
- ▣ Legal Framework (control and regulations) based on realistic standards
- ▣ Promoting research for better understanding of the problem and interdependencies
- ▣ Application of holistic health guidelines
- ▣ Monitoring and evaluation of wastewater generation and use



....Conclusions

- ▣ Institutional manageability through inter-disciplinary institutions
- ▣ Information, tools, techniques and technologies
- ▣ Training and human resources development
- ▣ Societal participation and awareness building



THANKS

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