INTEGRATED RIVER BASIN MANAGEMENT

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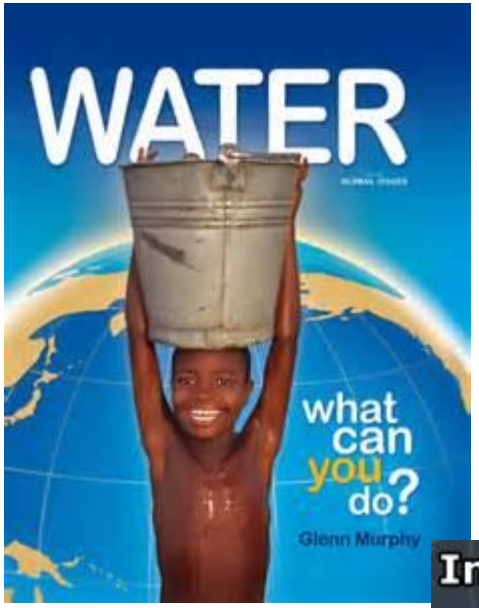
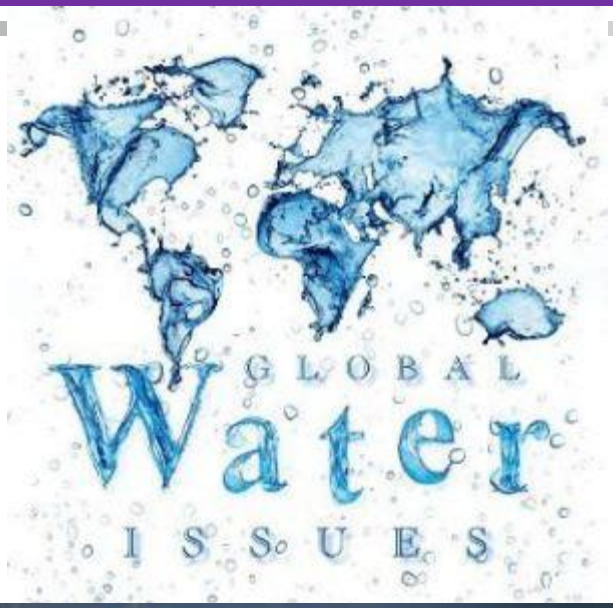
PRESENTATION FORMAT

We lead

- INTRODUCTION-Water Issues of the world
- Definition of IRBM
- IWRM & IRBM
- IRBM in Malaysia

WATER ISSUES



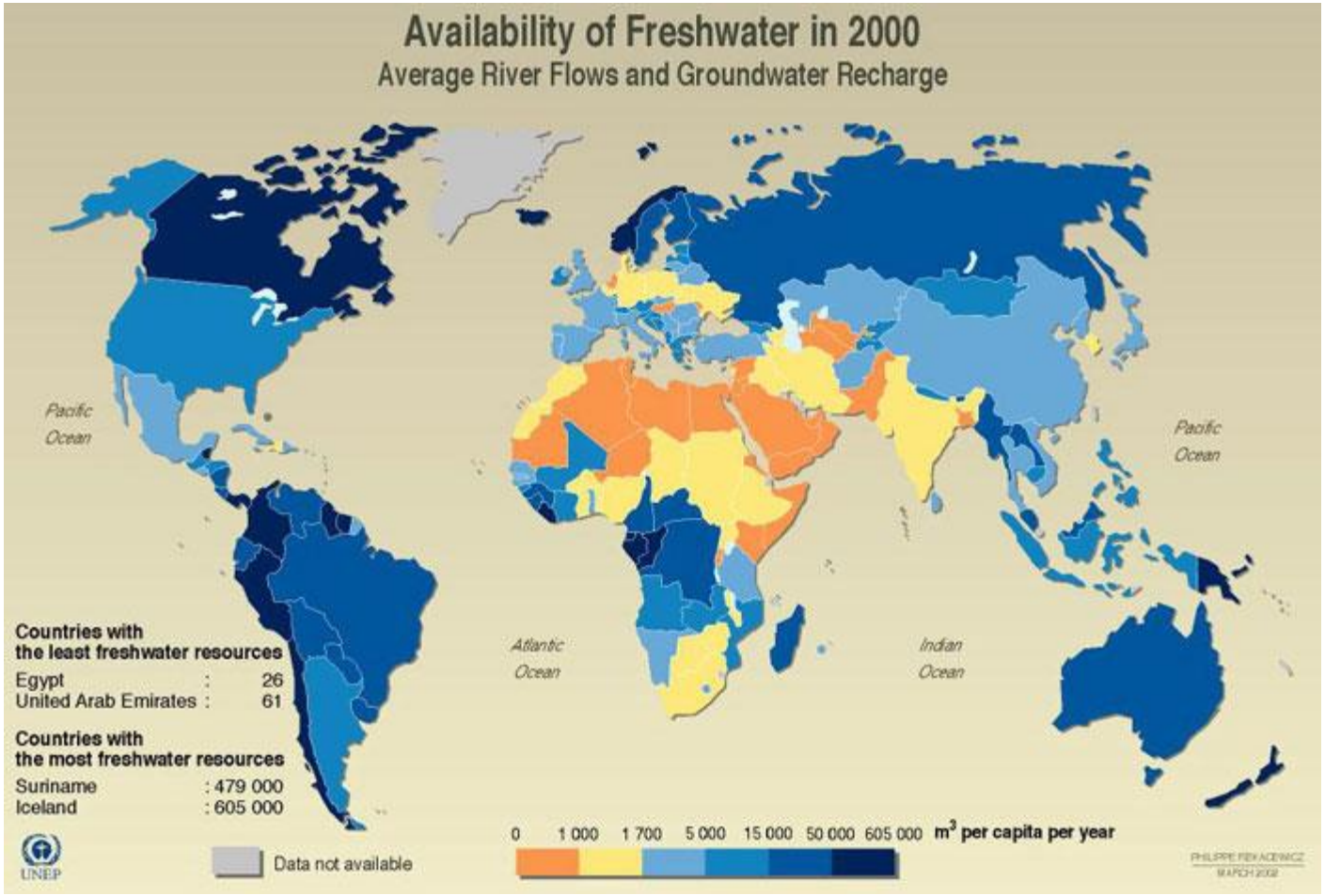


WATER USE

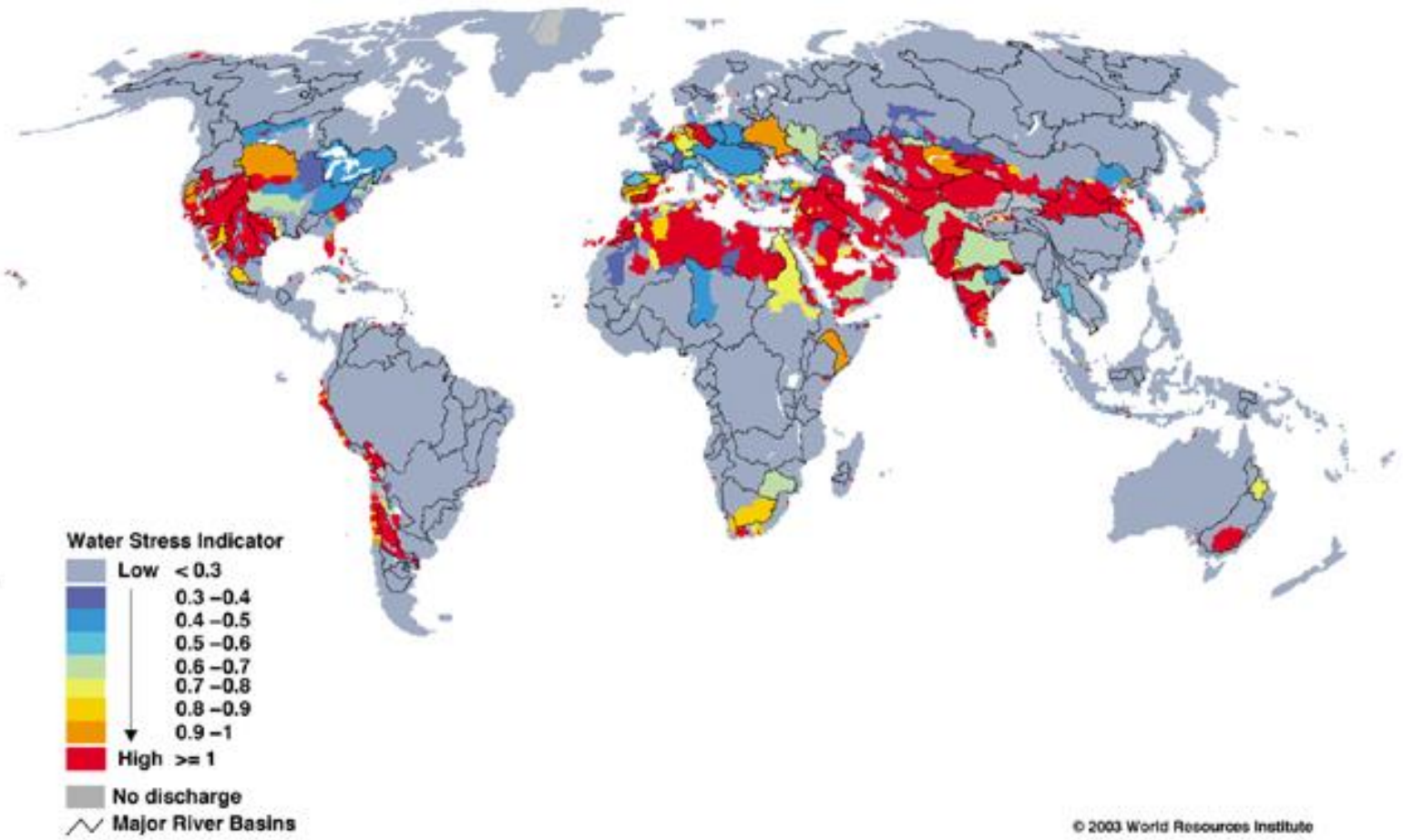
- WATER- life essential ingredient
- 100 year – during last century global water use increase more than twice the rate of population growth
- 70% of world fresh water is used to produce food
- 40% of world food supply is produced using irrigation
- By 2025 water use is predicted to increase by 50% in developing countries; 18% in developed countries; 2/3 of world could be in water stress condition
- By 2050 The world water supply will be pressured to provide more food and energy for further 2 billion people
- *from Donald Danforth Plant Science Center*

FRESHWATER

- The second World Water Forum (WWF) held in March 2000 highlighted the growing global concern about freshwater, and the complexity of the challenges facing developing countries striving to attain effective water governance (Cosgrove & Rijsberman, 2000).
- In the 20th century, freshwater withdrawals grew dramatically, resulting in water stress in many countries of the world (Seckler et al, 1998).
- While it has become conventional to cite water scarcity as a significant threat to human well-being, a danger of the water scarcity narrative is that it obscures issues concerning unequal access to and control over water (Mehta, 2000).


Availability of Freshwater in 2000
Average River Flows and Groundwater Recharge
Pacific Ocean
Pacific Ocean
Atlantic Ocean
Indian Ocean
Countries with the least freshwater resources
Egypt : 26
United Arab Emirates : 61
Countries with the most freshwater resources
Suriname : 479 000
Iceland : 605 000
UNEP
Data not available
0 1 000 1 700 5 000 15 000 50 000 605 000 m3 per capita per year

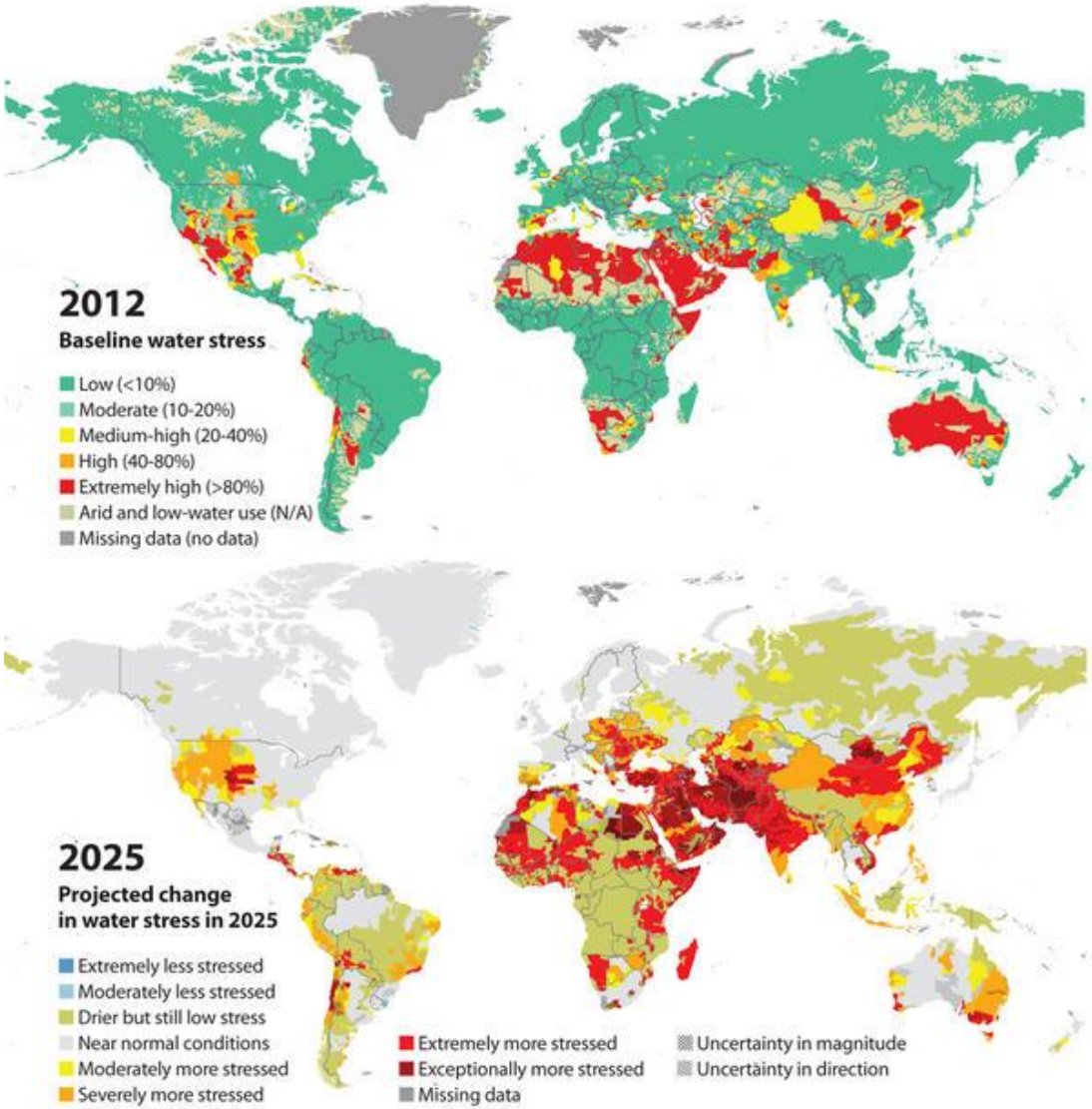
Water Stress Indicator



PROJECTING WATER STRESS

The World Resources Institute Aqueduct Water Risk Atlas – an online interactive tool sponsored by private businesses, governments, and charitable foundations – uses hydrological modeling with climate change and socioeconomic factors to project future water stress scenarios (wri.org/aqueduct).

Below, a 2012 baseline water stress map shows extremely high stress areas in red. The map below uses yellow, orange, and red to represent *change* in water-stressed areas projected for 2025; it is a middle-ground scenario between most-pessimistic and most-optimistic climate change and socioeconomic factors.



USAGE

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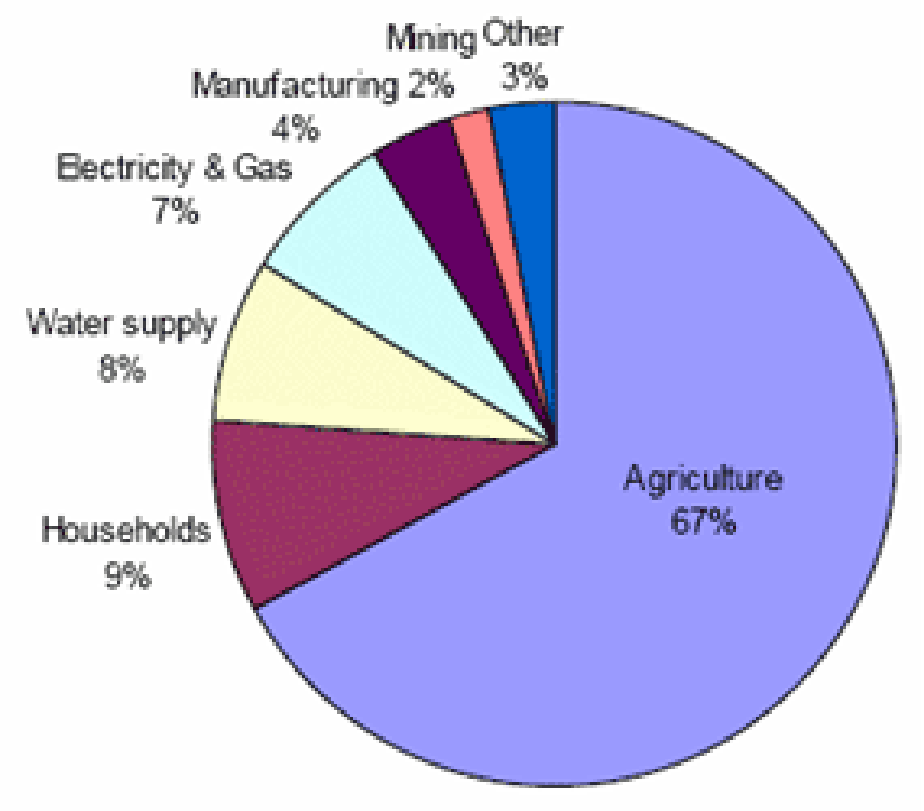
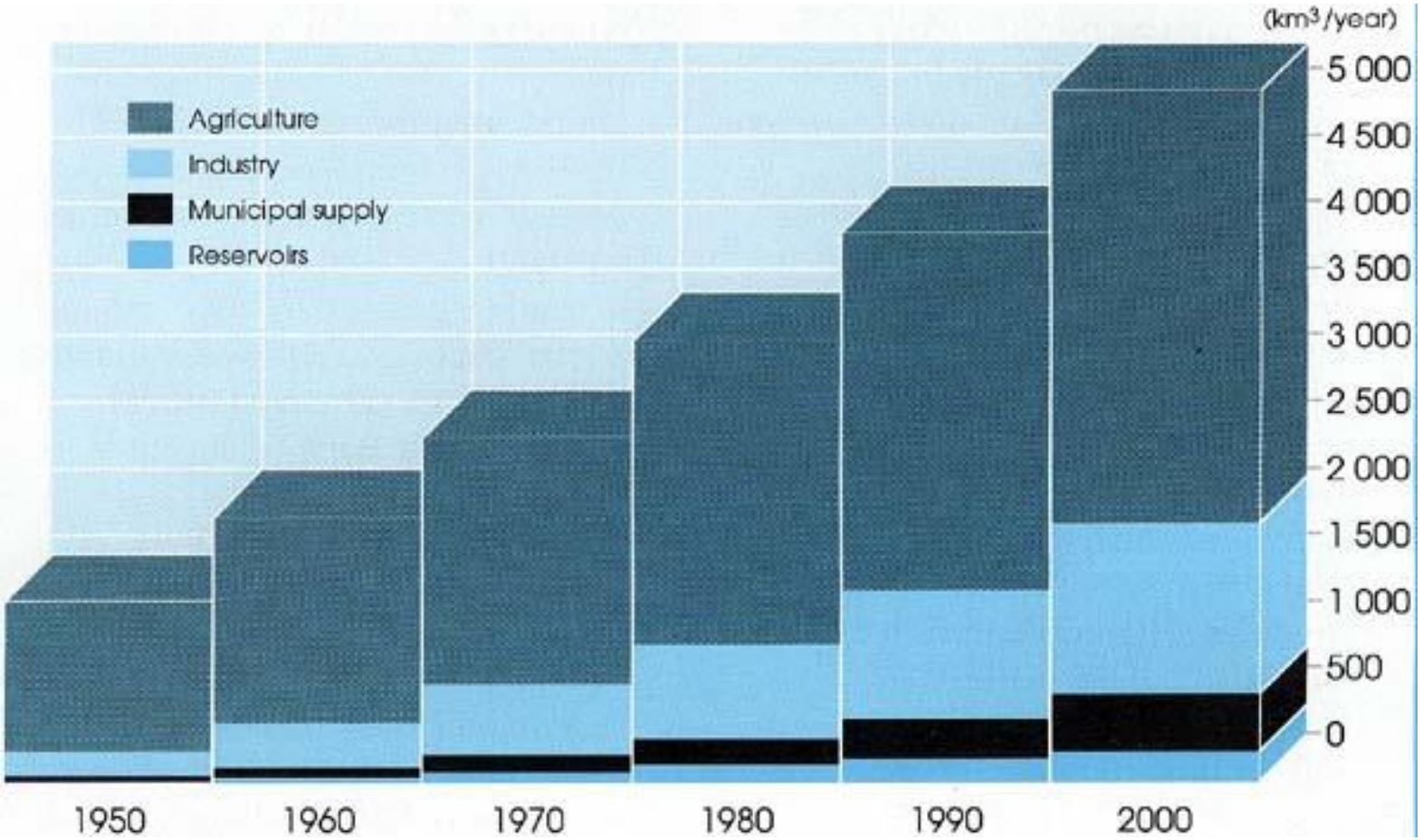
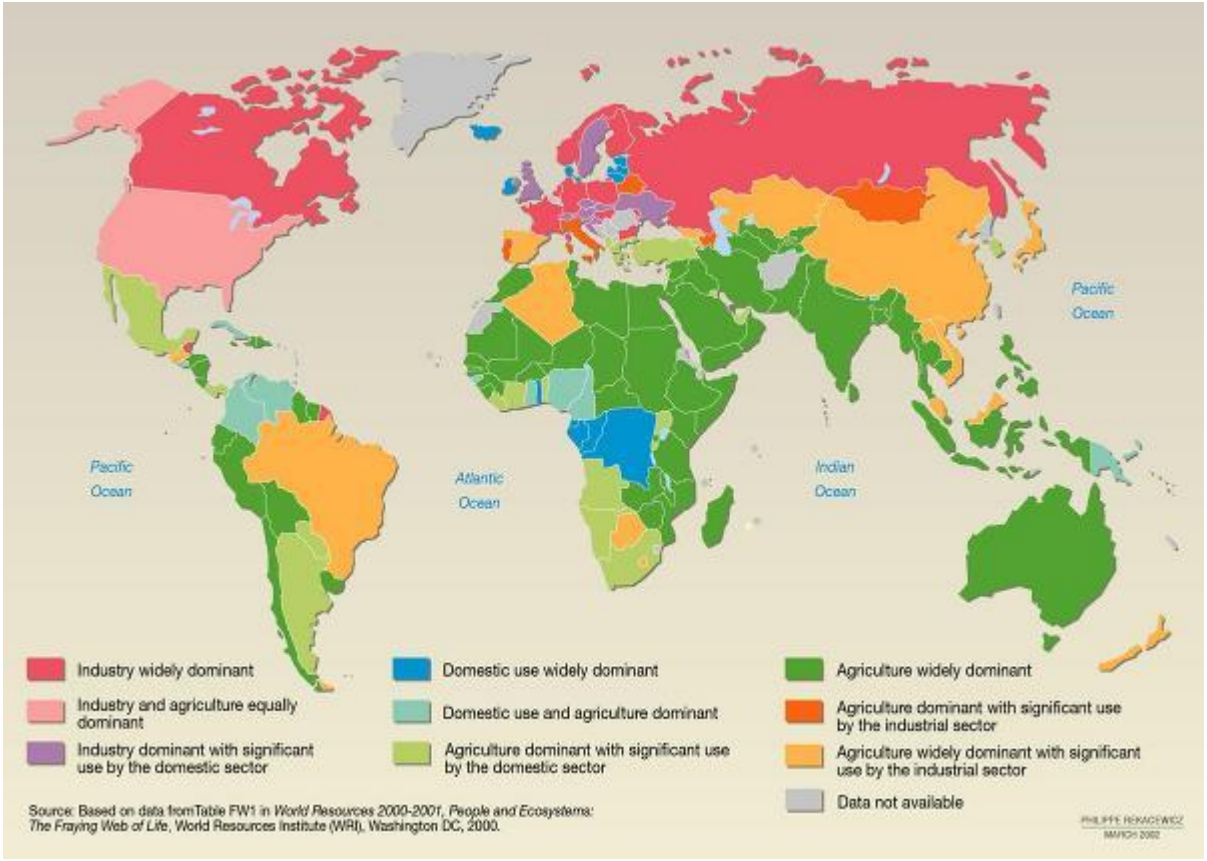
- **Water** use in the world (2005)




(km³/year)
Agriculture
Industry
Municipal supply
Reservoirs
5 000
4 500
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1950
1960
1970
1980
1990
2000

Freshwater use

- While freshwater supplies are clearly limited, for most people water scarcity is caused by competition between water uses and by political, technological and economic barriers that limit their access to water (Falkenmark & Lundqvist, 1998).



- Half of the world's population will be living in areas of "acute water shortage" by 2030

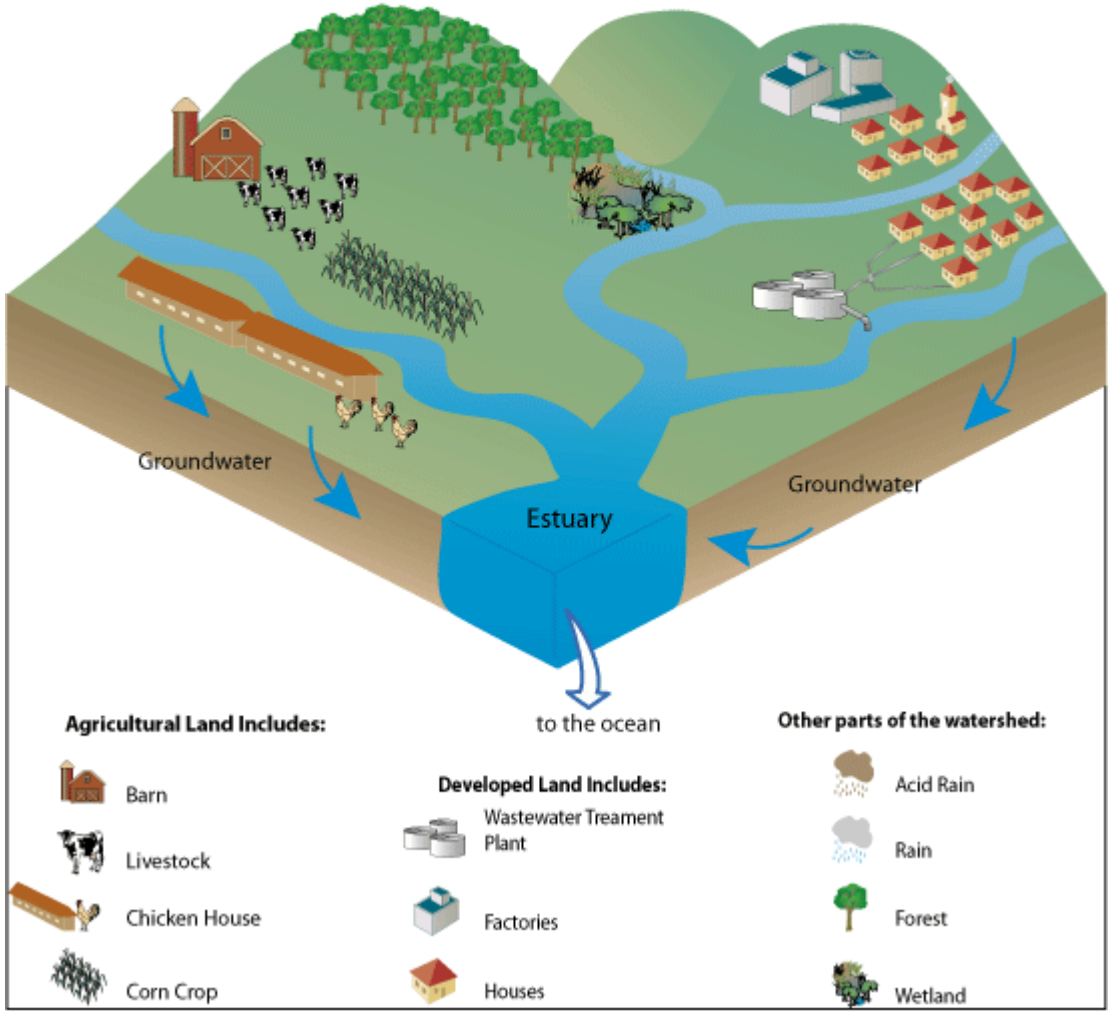
RIVER BASIN

- Water source and supply from river basin
- What cause supply to dwindle and reduced
  - Deforestation- lesser sponges, more runoff
  - Soil erosion
  - Pollution from agriculture
  - Over-exploitation
  - Climate change

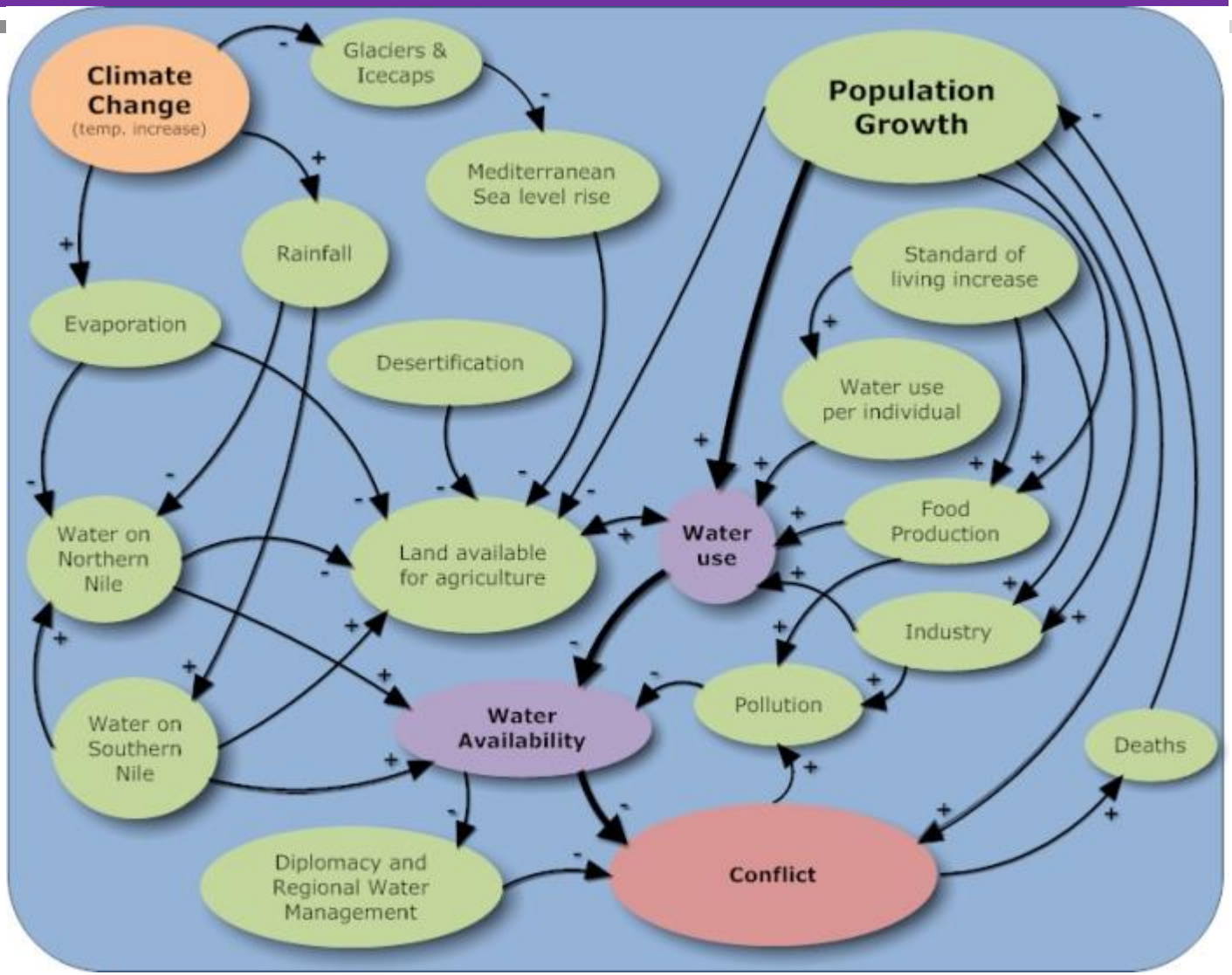
Soil erosion and deforestation

Irrigation and flood

WHAT HAPPEN IN A RIVER BASIN



Human and natural impact on water



Human impact

- River basins are complex systems, where water flows through a catchment from lakes, rivers and groundwaters towards estuaries and finally the sea. There are many interdependent components in river basins.
- Any activities in the basin can have adverse effects on the status of water and its ecology, as well as having potential regional, social, environmental, and economic implications. Management practices that respond only to a single water use, a single population segment, or a single sector may disturb other uses, populations, and sectors. (Lee & Dinar, 1996).

Human impact

- Change in focus on economic development involves a change on emphasis on different sectors such as transformations from an agriculture-intensive to industry-intensive activity which resulted in changes in land use activities.
- Changes in land use such as deforestation, agriculture and industrial and residential development have large impacts on water quality in many river systems. Rapidly growing cities and industries, expansion of the mining industry and the increasing use of chemicals in agriculture have undermined the quality of many rivers.

RIVER BASIN MANAGEMENT

Definition of IRBM

- "process of coordinating conservation, management and development of water, land and related resources across sectors within a given river basin, in order to maximise the economic and social benefits derived from water resources in an equitable manner while preserving and, where necessary, restoring freshwater ecosystems" (Global Water Partnership, 2000).

Main objective of IRBM

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- The main objective of the Integrated River Basin Management
- “ to establish a balance between the existing natural functions of the river system and the developed aspects of the system. The management actions should fulfil the expectations of the society for industrial use, recreation, nature management, and agricultural purposes”

IRBM

- ***IRBM - Main aim of the Water Framework Directive***
- The Integrated River Basin Management is the main aim promoted by the European Water Framework Directive (WFD) (Council of the European Communities, 2000), which came into force in December 2000.
- It is a holistic approach addressing, in addition to quality of rivers, lakes, transitional waters, coastal waters and groundwaters, pressures within the catchment that may cause deterioration or provide risk to water and its ecology (Griffiths, 2002).
- The sustainable management of both terrestrial and aquatic habitats is an integral part of the WFD. It requires better understanding of pressures and their impacts on waters and the response of aquatic systems.

IRBM

We lead

Why Do We Need IRBM?

- The ecologist realises that everything in a river basin interacts: land use, economic activities, water resources, water supply, water pollution and aquatic life. But for others this is not the norm. One reason for this is due to the traditional set up of legal and administrative roles aligned with different sectors. This situation results in separate responsibilities for, among others, water supply, land management and pollution matters. For some this works because each institution has clear objectives and defined management duties. But nature is not segregated so easily; it functions as an integrated entity.

Problem of borders

- River basin are important ecological units, crucial for water and for life. However, natural basin borders rarely coincide with political and administrative borders, making it difficult to oversee and attend to the ecological linkages across basins.
- Thus, it is necessary to establish a mechanism that can merge coordination and seek cooperation not only across sectors, but also across political and administrative borders.

IRBM

- IRBM is not a technical solution. Rather, it is an approach to water resources management that takes into account all factors linked to land and water resources, including social and economic activities..(Keizrul & Christensen 2000)

- integrated river basin management (IRBM) approach as a subset of integrated water resources management (IWRM) approach.

IWRM & IRBM

- Rapid changes in land activities may increase the sources of pollution loads in the river systems. Maintaining good water quality is a growing concern in water resources management around the world. IWRM and IRBM when applied to water systems involved integration between freshwater and coastal zones; land and water; surface water and groundwater; quantity and quality and upstream and downstream.

IWRM & IRBM

- The concepts of IWRM and IRBM treat water as a finite and vulnerable resource, water as an economic good and water governance should be based on a participatory approach involving all levels of stakeholders.
- The integration means integration within and between natural and human systems. Water resources management has often focused on satisfying increasing demands for water without adequately accounting for the need to protect water quality and preserve ecosystems and biodiversity. The changing in government policy plays an important role in increasing the complexity in managing water resources.

Concepts of IWRM and IRBM

- The concept of Integrated Water Resources Management (IWRM) was already recognized in Agenda 21 of the United Nations Earth Summit on Environment and Development that was held in Rio de Janeiro in 1992.
- At the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, the international community has also took an important step towards more sustainable patterns of water management by developing IWRM and water efficiency plans with support to developing countries.

- The principles to be adopted are economic efficiency, equity and environmental sustainability. There is also a need to develop a structural framework comprising management instruments, enabling environment and institutional establishment.
- IRBM which deals with issues of water allocation, pollution control, flood control is a subset of IWRM which addresses the broader issues of food self sufficiency, tariffs, cross subsidies, institutional roles, etc.

IRBM

- Integrated River Basin Management is an approach to water resource management that takes into account all the factors linked to the resources, including social and economic activities.
- It is very broad in scope to not only cover water, but also environmental management aspects such as land use issues, pollution control, development pressures and biodiversity conservation.

- Most people would agree that IRBM makes sense. However the key question is how to implement it? There is no single answer.

IRBM

- IRBM defined as the coordinated management of resources in natural environment (air, water, land, flora and fauna) based on river basin as a geographical unit/area with the objective of balancing man's needs with necessity of conserving resources to ensure their sustainability (Keizrul, 2000).
- It means that river basins need to be managed in an integrated and holistic manner (IRBM). The river basin approach not only focuses on water itself and the services it provided to society but also to water related ecosystems, terrestrial and aquatic.
- Hence, IRBM would invariably address the integration of natural limitations, social and economic demands, legal, political and administrative processes.

- The concept of IRBM is recognized as highly desirable but is very far from being applied universally. Administering a river basin through a single organization may appear to have advantages over establishing various bodies. However, even where one organization has overall responsibility for a basin, the same compromises have to be reached internally which may be easier but does not have the advantages of transparency resulting from more open debate through public scrutiny (Brown, 1994).

IWRM

- IWRM may be defined as a process that promotes the co-ordinated development and management of water, land and related resources in order to maximise the resultant economic value and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP-TEC, 2004).
- IWRM is a comprehensive approach to the development and management of water, addressing its management both as a resources and the framework for provision of water services. IWRM includes social, economic and environmental factors in the planning, development, monitoring and protection of land and water resources.
- Hence, IWRM is not limited to addressing just physical relationships or water resources characteristics. It also includes water as an integral part of the ecosystem, a finite natural resource and a social and economic good (Davis and Hirji, 2003).

IWRM..continue..

- IWRM approach in Malaysia has also been discussed by Mazlin and Ghani (2003). IRBM as a sub-set of IWRM deals with management at the basin level involving aspects like water allocation, pollution control, flood control, etc. (Clausen, 2000).
- IWRM includes the planning and management of water resources both conventional and unconventional and land. This takes account of social, economic and environmental factors and integrates surface water, ground water and the ecosystems through which they flow. It also depends on collaboration and partnerships at all levels from individual citizens to international organizations, based on a political commitment to and wider societal awareness of the need for water security and the sustainable management of water resources (Shahrizaila, 2000).

IWRM..continue

- The Integrated Water Resources Management (IWRM) concept was first introduced in Malaysia in various forms in the early 1990s by water technical agencies such as the Department of Irrigation and Drainage (DID). It has already accepted as an innovative approach in managing its water resources.
- The formation of institutions such as the Malaysian Water Partnership (MyWP) in 1997 was also supported this initiative towards sustainable water resources management in Malaysia.
- Followed by the establishment of Malaysian Capacity Building Network for IWRM (MyCapNet) in 2001 to promote IWRM and capacity building in Malaysia.

IRBM IN MALAYSIA

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- Although Malaysia is blessed with an abundance of water, Malaysia's water resource management has also been facing numerous challenges such as water demand management in major urban centres, rain water harvesting, pollution control of point sources and nonpoint sources, solid waste management, efficient water use, water tariff setting based on stakeholders' decisions, reduction of nonrevenue water loss, business opportunities for new investments, planned urbanization and active participation of stakeholders for decision making.

IRBM in Malaysia

- Malaysia adopted IWRM as an innovative approach to managing its water resources. Clear pronouncements to the effect are found in the 3rd Outline Perspective Plan (OPP3) and the 8th Malaysia Plan (MP8) documents.
- The adoption provides the necessary impetus to break away from traditional practices characterised by multiple individualist sector-centred approaches. In line with the current international trend, the new approach promises to overcome deficiencies in cross-sector co-ordination, reduce conflicts and inefficiency and engenders equity.

- To date, the implementation of IRBM in Malaysia is still at an initial stages, where most of the programme is related to awareness, capacity building and establishment of institution (Hamidon, N. 2011)

- Under the Malaysian constitution, water is a state matter. Nevertheless when it comes to water resources development, utilization and management both the federal and state governments are involved.
- This is because the responsibility for water resource administration is fragmented and is shared among a number of federal and state agencies each of them have their own specific involvement in water related issues (Welch and Keat, 1987).
- Their interest in water related matters could be viewed from any one or more of the following 3 aspects:
- The planning, development and management of water resources aspect
- The protection and conservation of water aspect
- The land-use control and watershed management aspect

- The integration will take into account the coordination in decision making among different levels of government and among various sectoral departments and agencies within government, private sectors, NGO's, communities and also universities or research institutes.
- It is also the integration in terms of holistic approach management that looking at overall development in the river basin to avoid conflict among users.

IRBM in Langat River Basin

- The adoption of IRBM resulted in some ad hoc changes in institutional arrangement but policy outcomes still remained significantly short of policy intentions, as indicated by some evidence in existing attributes of the biophysical settings of Langat River Basin (LRB) and from the results of stakeholder interviews.

IRBM for Langat

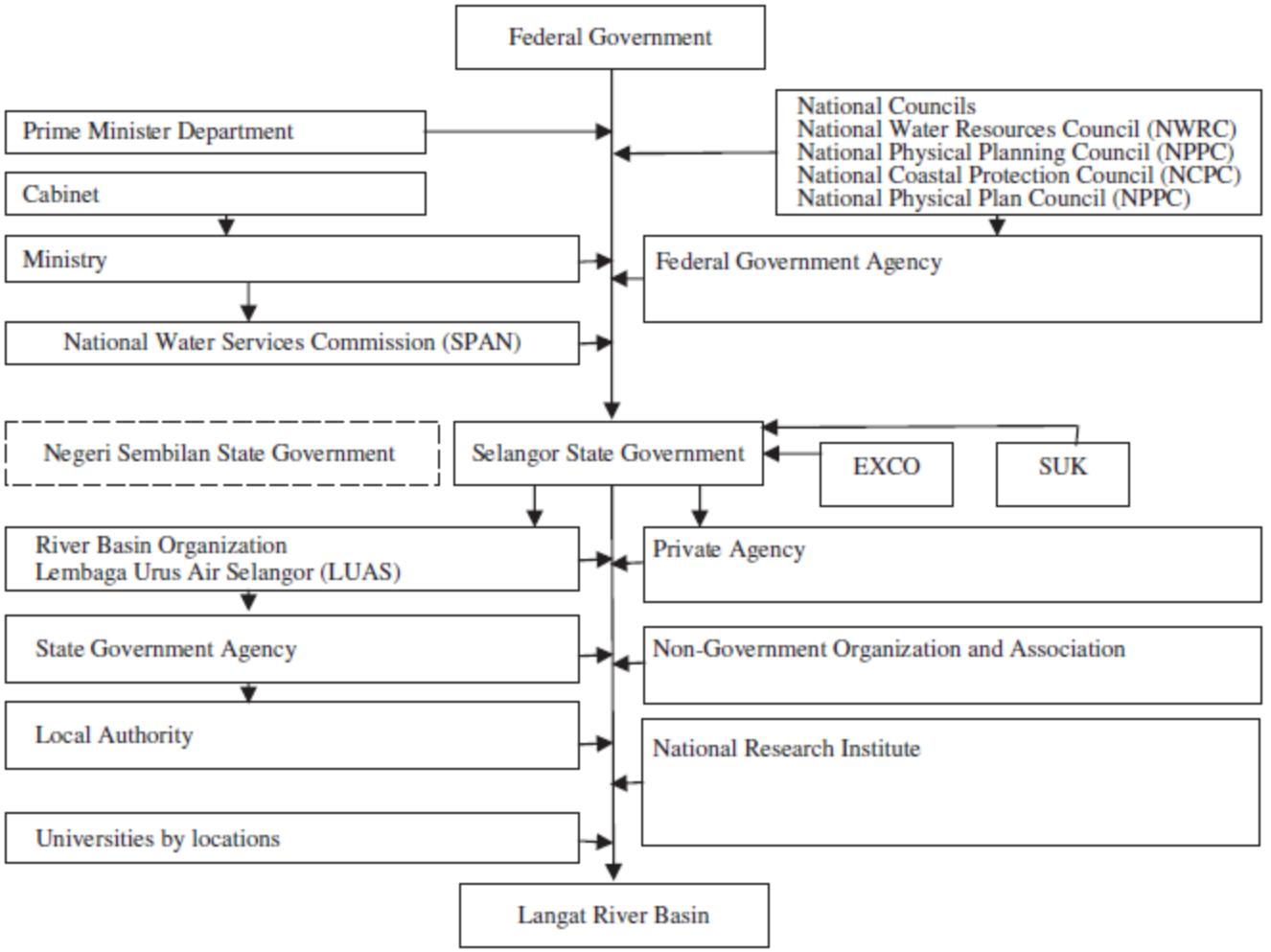

Fig. 2. Interorganizational network for IRBM in LRB.

Interview respondents

- Percentile analyses of stakeholder interview data revealed that 96% of the total respondents were aware of their river systems.
- Respondents' perception on enforcement for river water quality is consistent with the prevailing river water quality along the river reaches. The upstream people are more satisfied than the downstream people for enforcement on river water quality.
- Only 36% of the total respondents agreed about the fair standards of sewerage systems in the basin area. Water quality degradation and solid waste management were the two priority environmental problems as identified by the respondents.
- Only 29% of the total respondents knew about the river basin organization (LUAS) and its activities. It indicated that the river basin organization (LUAS) could not adequately arrange local peoples' participation for decision making in its activities.
- About 82% of the total respondents expressed interest to participate in the IWRM and the social learning programme.

- It was very clear from the review of the institutional arrangements that water resources administration in Malaysia has been fragmented due to presence of a number of laws/rules associated with water resources management.
- These laws/rules formed a complex rule making process within the hierarchic interorganizational network of Federal administration. But creation of LUAS and SPAN opened up new scopes for coordination and integration among agencies and stakeholders who have been responsible for IRBM in Langat River Basin. (Mazlin et al 2011)

CONCLUSION

- Proper management of river basins are important in reducing water pollution which not only causes degradation in the upstream areas but also downstream; as well as coastal and estuarine areas.
- River basin management should take into consideration the integration of the roles played by various agencies (both government and private sectors and NGO's and the citizens), land use development activities and protection of vital ecosystems.
- Strong coordinated national actions are required to integrate legislation and also all the related agencies that are related to river and water resources management.

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Thank you
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