ASEAN FLOOD MANAGEMENT
CASE VISIT @ MALAYSIA

Managing Water Resources Through River Basin @ Integration Approach

Md Khairi bin Selamat

Director, River Basin Management Division

Department of Irrigation and Drainage Malaysia

WATER RESOURCES

Ministry of Water, Land and Natural Resources











Government of Malaysia

Content of presentation

1. Introduction
2. Issues
3. Problem statement
4. Solution
5. Conclusion

"Effective investments for today's children are fundamental for a better and more equitable world in the future. The Copenhagen Consensus Center brings a simple but compelling logic to this endeavor: if we want to make sure that this world is realized for our children, let's focus on the investments that will generate the most good".

- Richard Morgan, UNICEF Senior Advisor on the Post-2015 Development Agenda

Introduction

- How flood happen?
- How to reduce the flood risk and hazard?
- How to optimise and take the opportunity?
- Planning and development of river basin, management of water resources; IRBM as management tools
- Flood water as resources for multiusers @ multipurpose
- Water quality related issues

Transformation

The Millennium Development Goals

Eight Goals for 2015

1. Eradicate extreme hunger and poverty
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. Develop a global partnership for development

NEW STRAITS TIMES

NATI

Master plan for river basins

Monitoring land use for development

By Jaswinder Kaur
news@nstp.com.my

KINABATANGAN, Mon. — The Drainage and Irrigation Department will formulate a master plan on

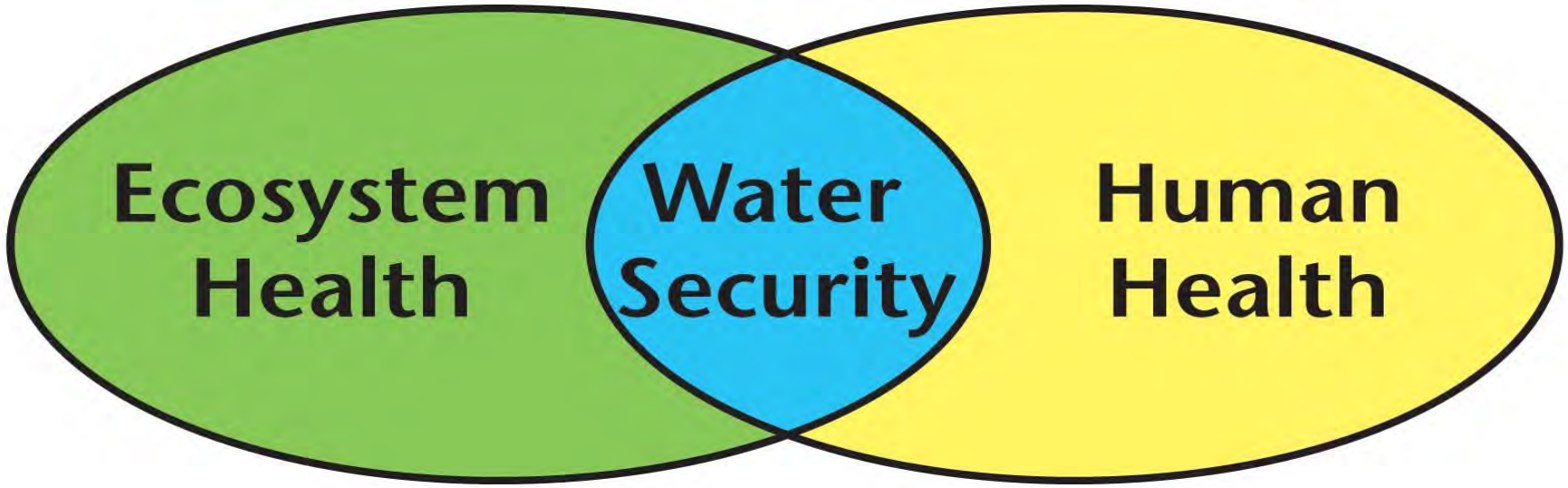
About 40 people representing government agencies, non-governmental organisations, students and members of the media participated in the expedition which was organised by DID under the "Love Our

"DID sees rivers as a heritage we should care for. Rivers provide 98 per cent of our drinking water while the remaining two per cent is from underground water," Keizrul said.

NWRC (29th July 2003) → River Basin Master Plans to be the Basis for Development within a River Basin.

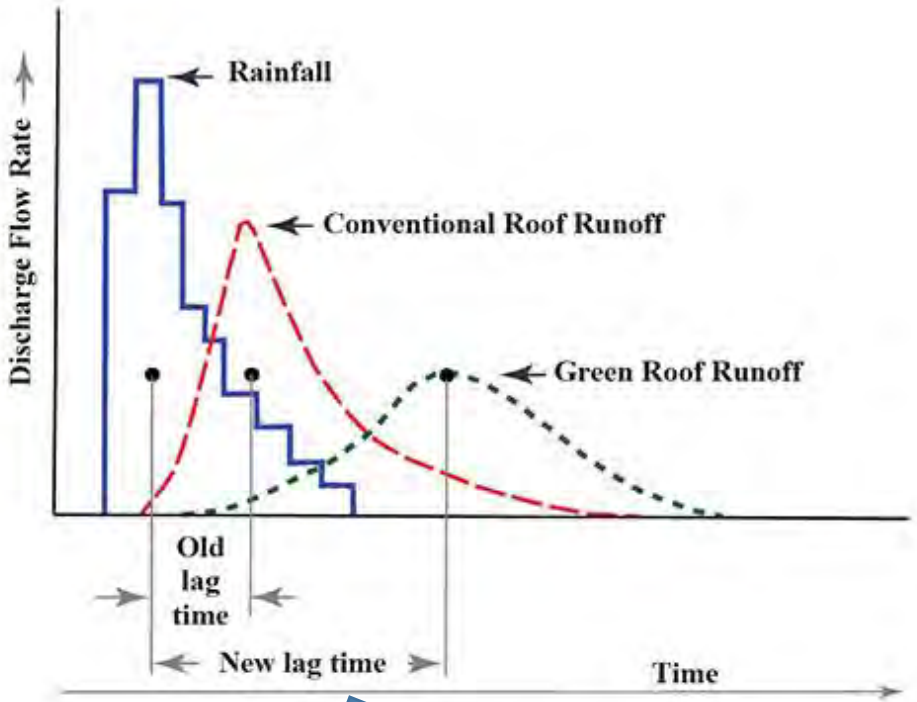
IRBM is not a technical solution but it is an approach to water resources management; land, water resources, social, economic activities, environmental aspects such as pollution control, development planning and biodiversity conservation.

Defining Water Security



Water Security :
« sustainable access on a watershed basis to adequate quantities of water, of acceptable quality, to ensure human and ecosystem health. »


Composes 15% of Brain
Helps carry Nutriends and Oxigen to cell
Regulator Body Temperature
Moistense oxigen for breathing
Help Convert food into energy
Makes up 83% of Blood
Removes Waste
Protects and Cushions Vital Organs
Accounts for 22% of Bones
Helps Body Absorb Nutrionts
Cushions Joints
Make up 75% of Musclos



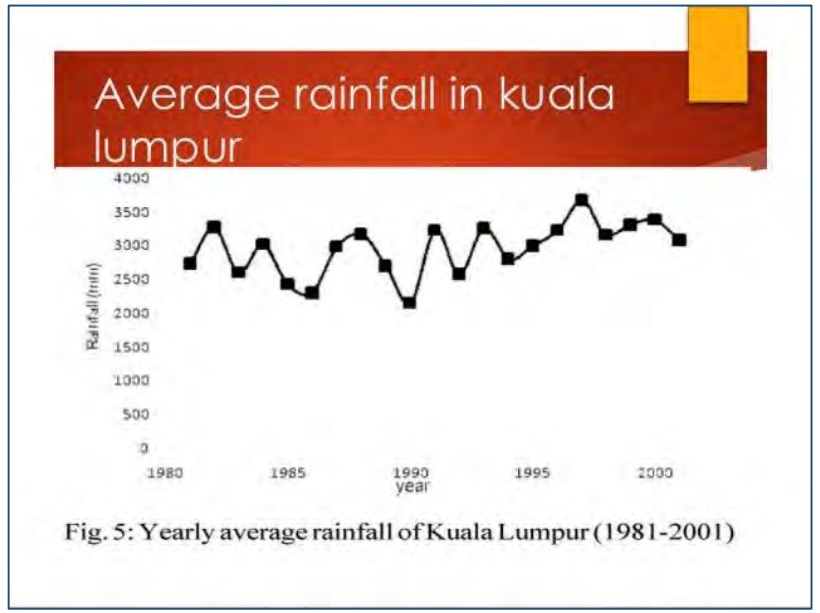
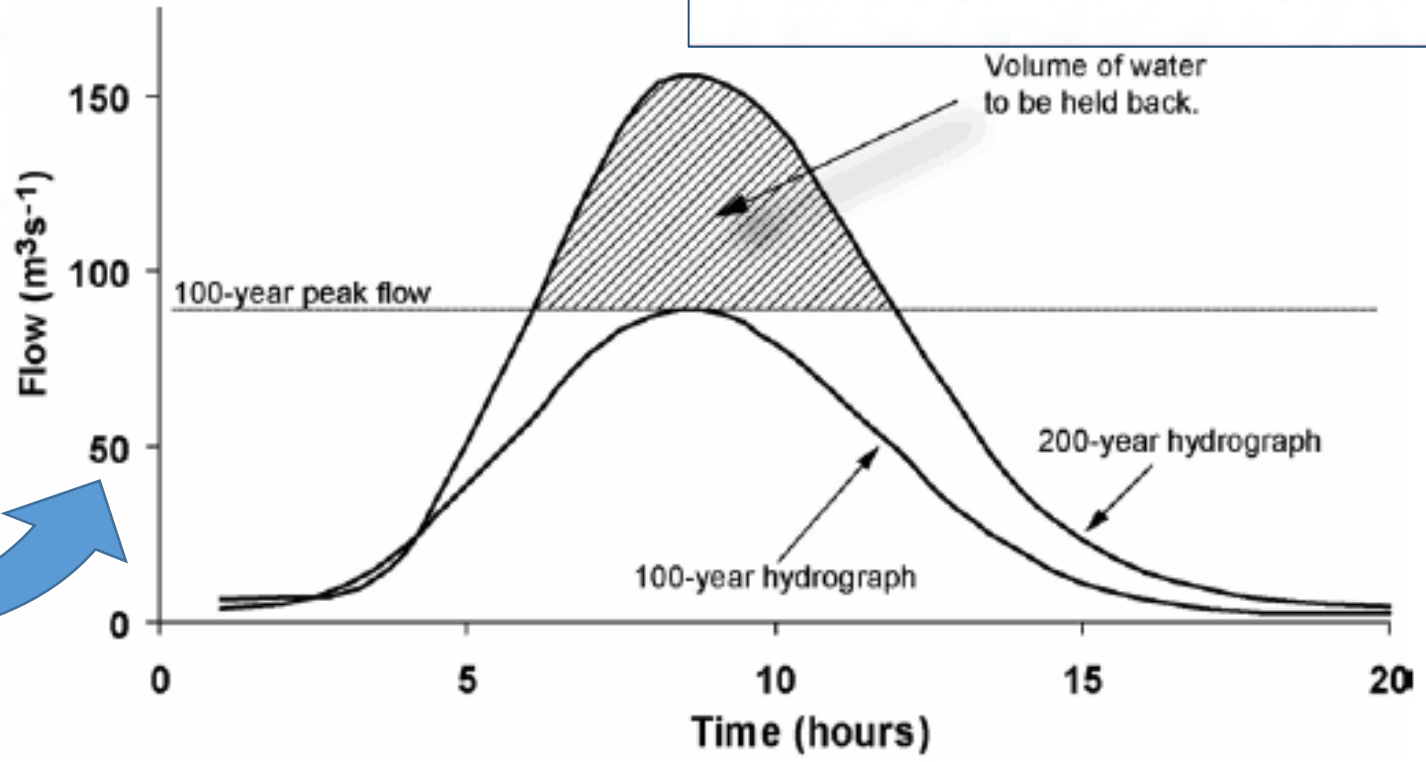
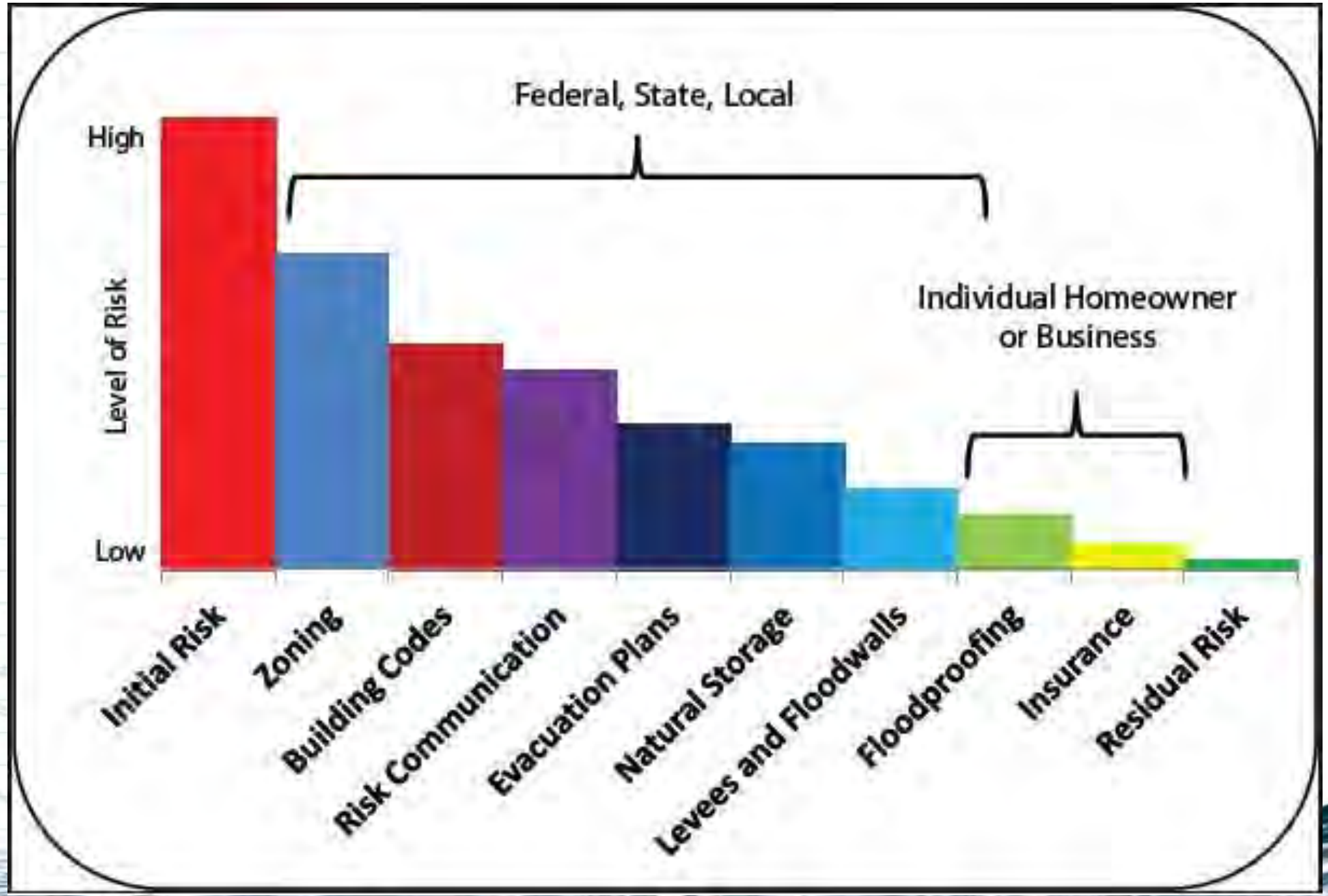
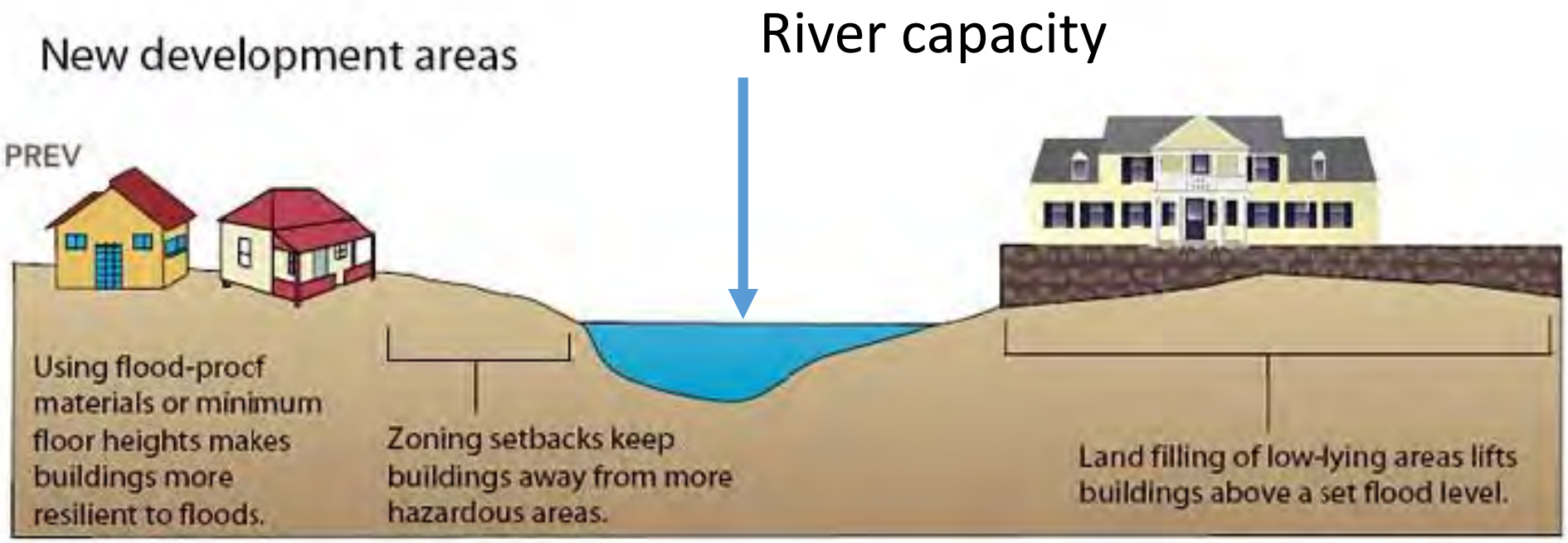


Fig. 5: Yearly average rainfall of Kuala Lumpur (1981-2001)



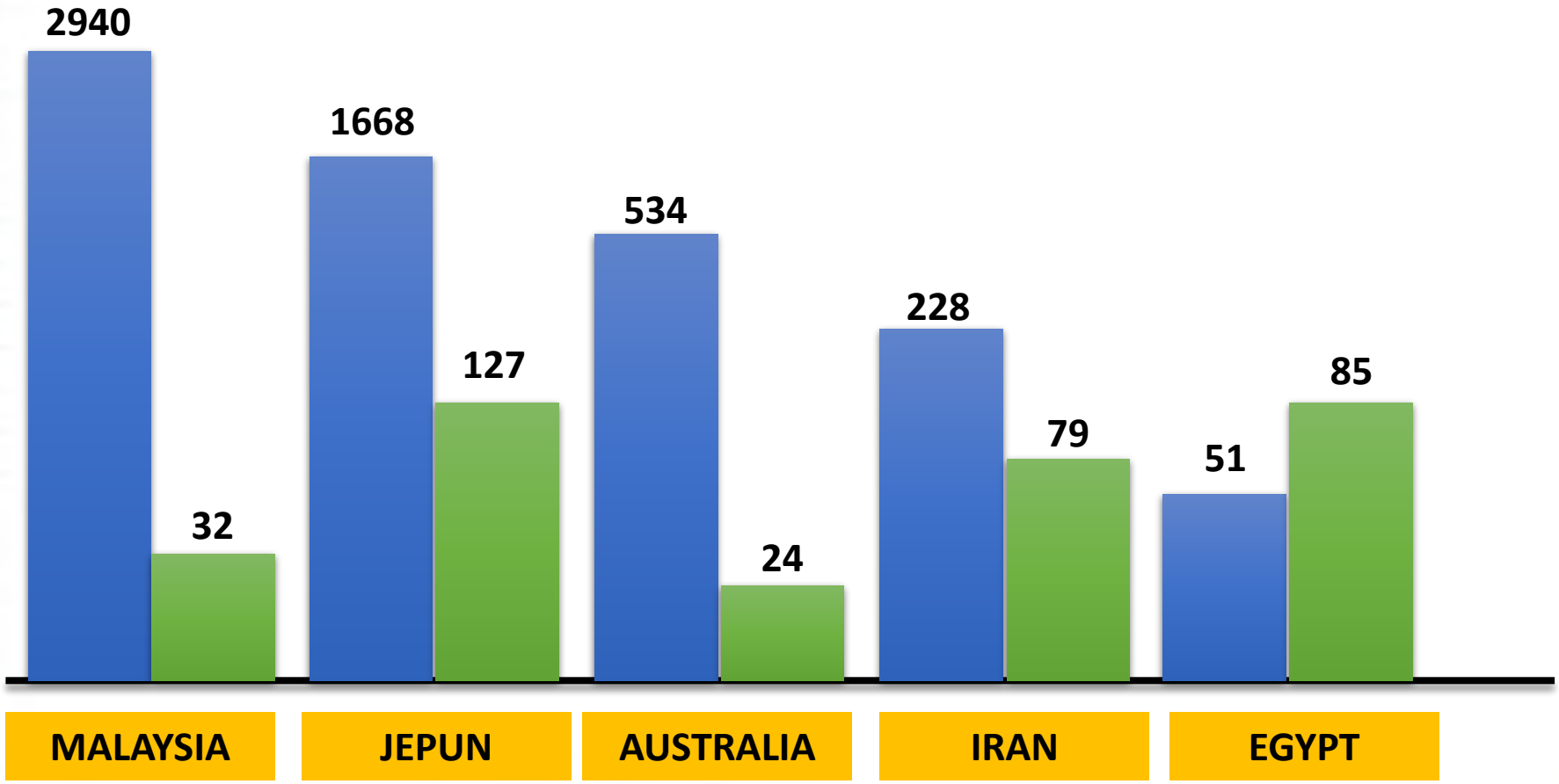

Federal, State, Local
High
Level of Risk
Low
Individual Homeowner or Business
Initial Risk
Zoning
Building Codes
Risk Communication
Evacuation Plans
Natural Storage
Levees and Floodwalls
Floodproofing
Insurance
Residual Risk


River capacity
New development areas
PREV
Using flood-proof materials or minimum floor heights makes buildings more resilient to floods.
Zoning setbacks keep buildings away from more hazardous areas.
Land filling of low-lying areas lifts buildings above a set flood level.
Existing development areas
Constructed levees can protect houses in flood-prone areas.
Voluntary or compulsory purchase can remove flood-prone houses from habitation.
Some existing buildings can be raised above the flood levels or built using flood-resistant materials to reduce flood damage.

Issues

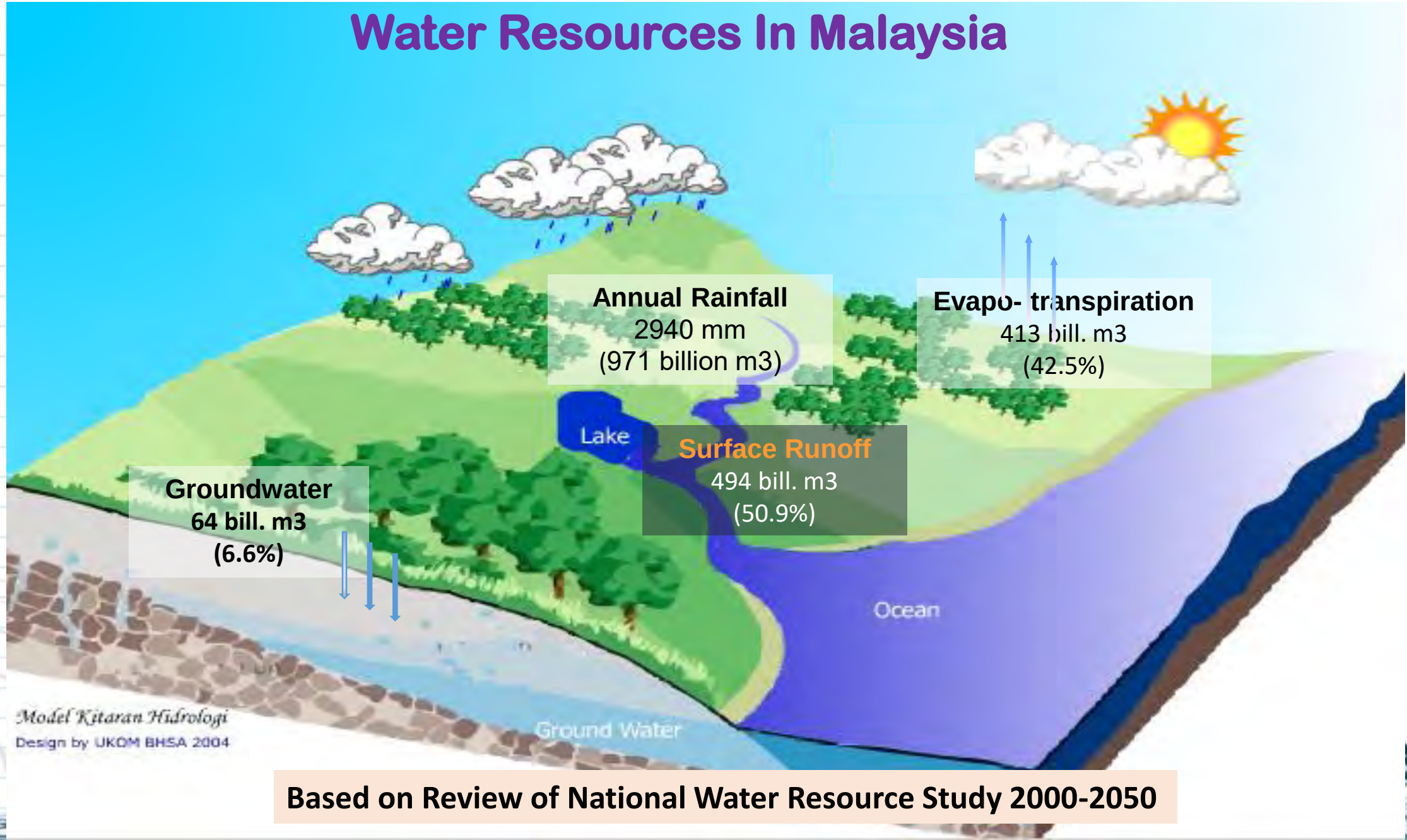
- Learning from the past
  - ✓ River not just as drainage system
  - ✓ Utilise flood water; not to discharge and waste
- Facing current scenario for the future
  - ✓ Water resources planning
  - ✓ Insufficient infrastructure
  - ✓ Consolidation and framework streamlining
- Imbalance of development and infrastructure
  - ✓ Carrying capacity
  - ✓ Density development; plot ratio

Comparative Total Rainfall



Sources: NWRS (2011)

Water Resources In Malaysia



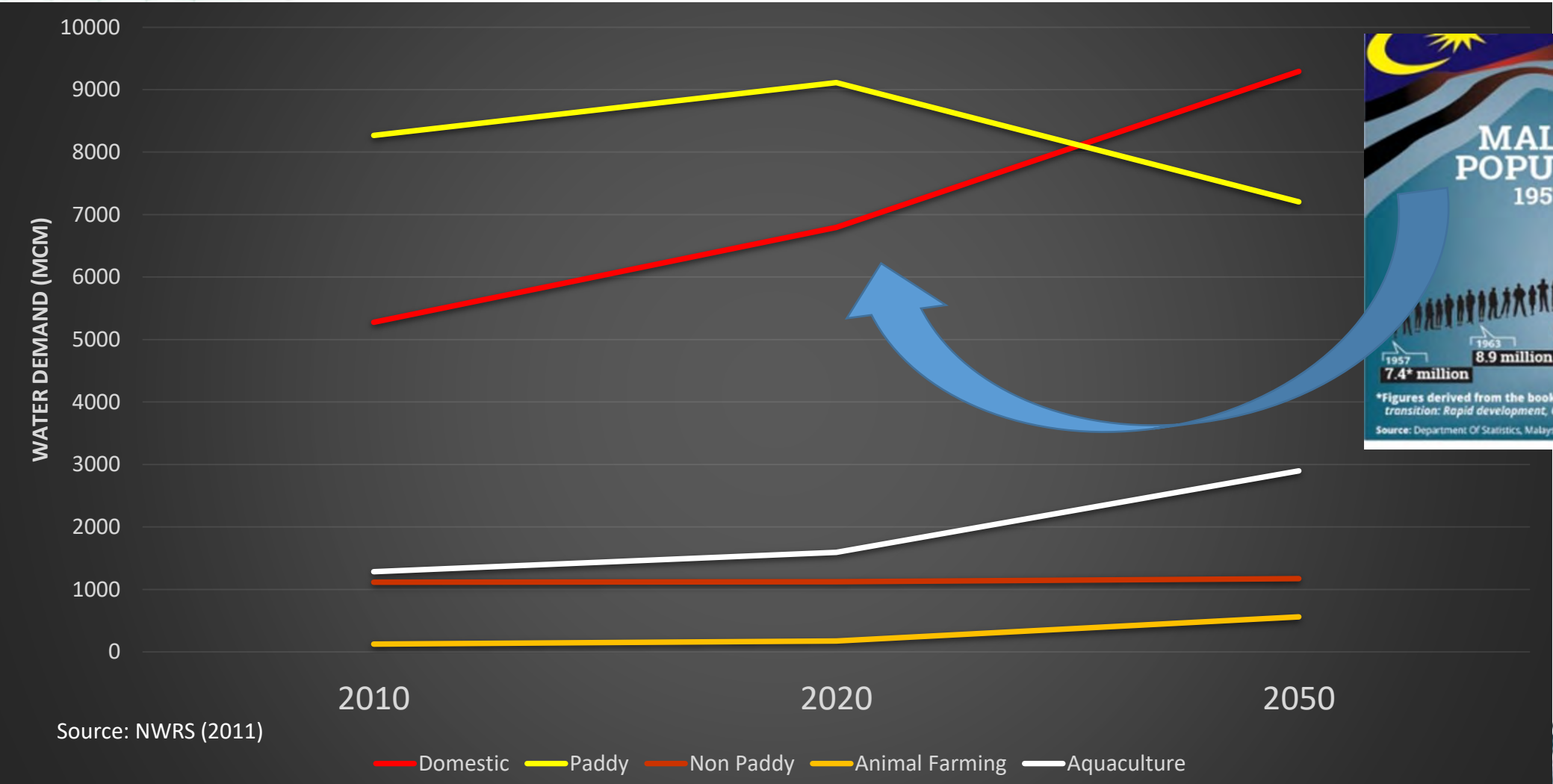
Based on Review of National Water Resource Study 2000-2050

Water Demand in Malaysia

2010
14,783 MCM

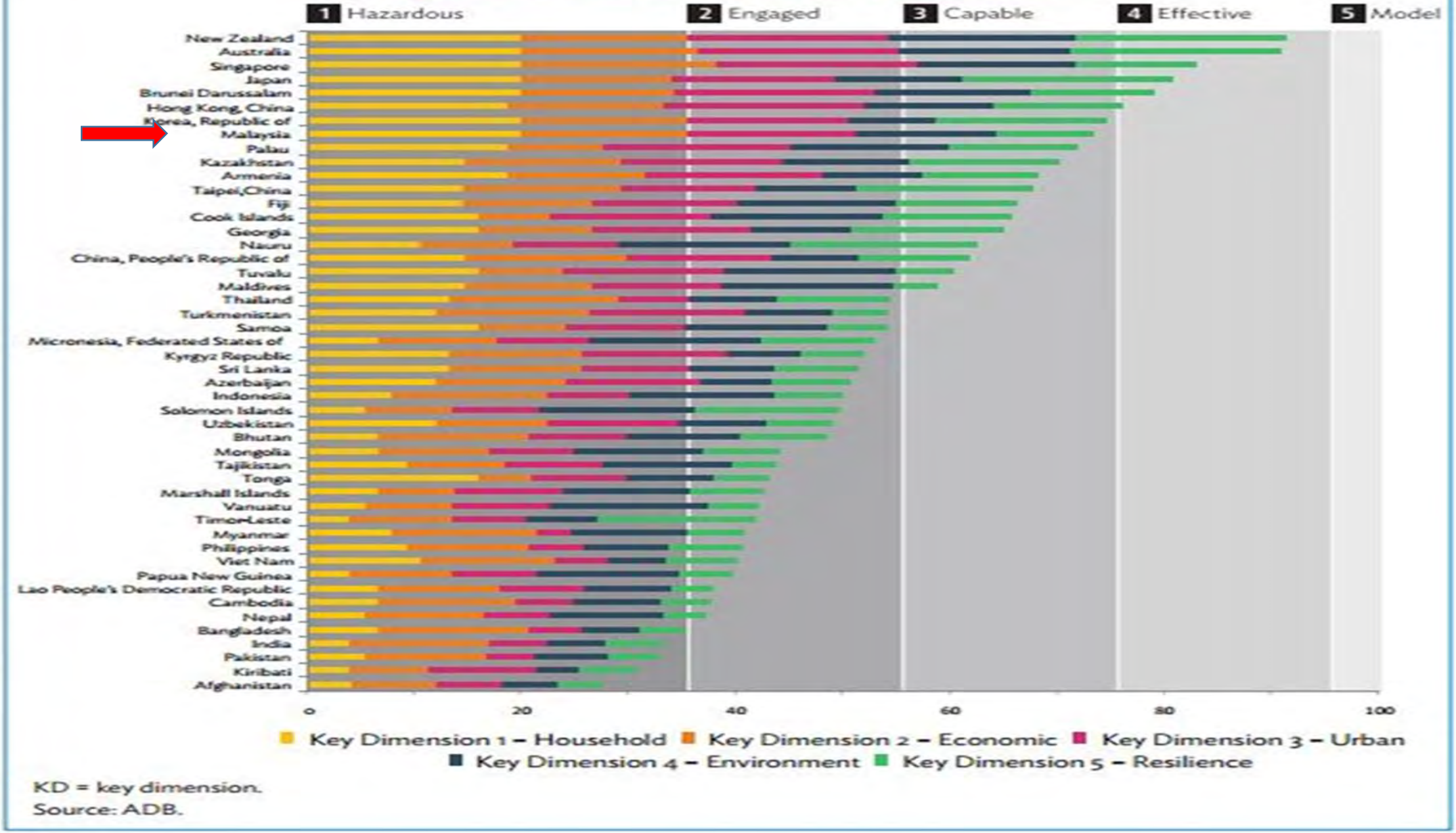
2020
17,206 MCM

2050
18,228 MCM



Source: NWRS (2011)

Figure 2: National Water Security Index Score



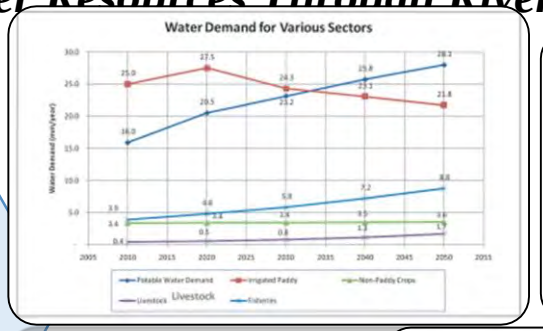
KD = key dimension.
Source: ADB.

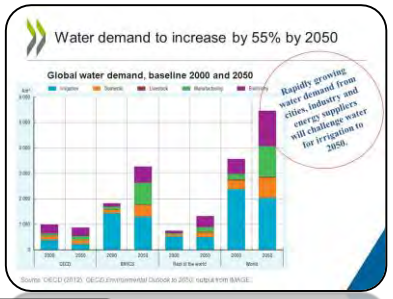
Implementation difficulties focus on institutional and process issues;

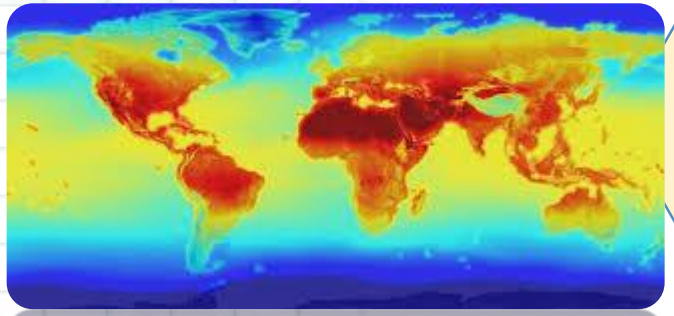
- Consultation and community participation
- Institutional barriers to effective integration; co-ordination and maturity, economic and environment
- Natural resources management and environmental policy and planning
- Incorporate differing values and expectations
- Economic analysis to assess the benefits and costs

Problem statement

INCREASING DEMAND

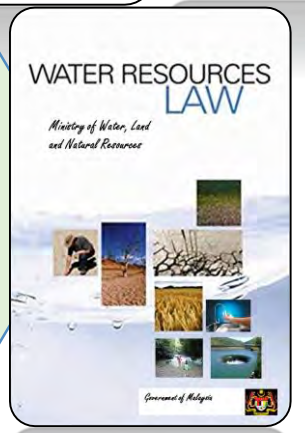




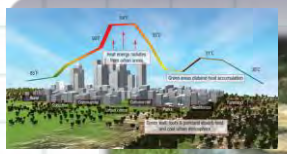


CLIMATE CHANGE

LEGISLATION



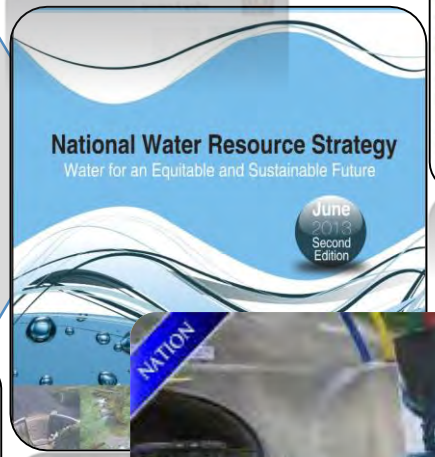
Limitation and legislation gap



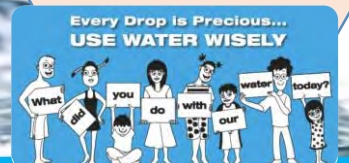
WATER RESOURCES

WATER QUALITY

INTER STATES WATER BALANCE



INEFFICIENT WATER RESOURCES MANAGEMENT



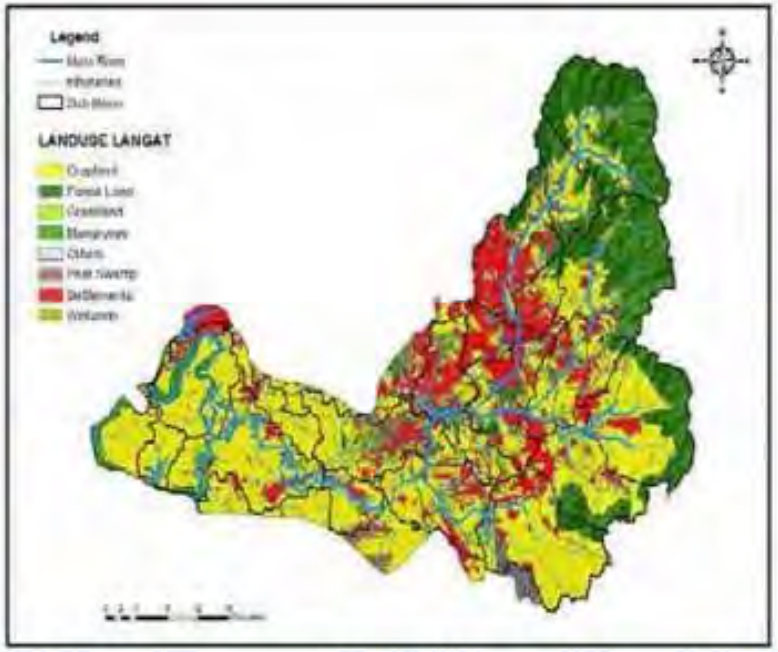

NATIONAL
Physical Plan
Framework for an integrated and
Sustainable Landuse Planning
manage
Environmental Sensitive Areas
safeguard
Water Resources
conserve
Prime Agricultural Areas

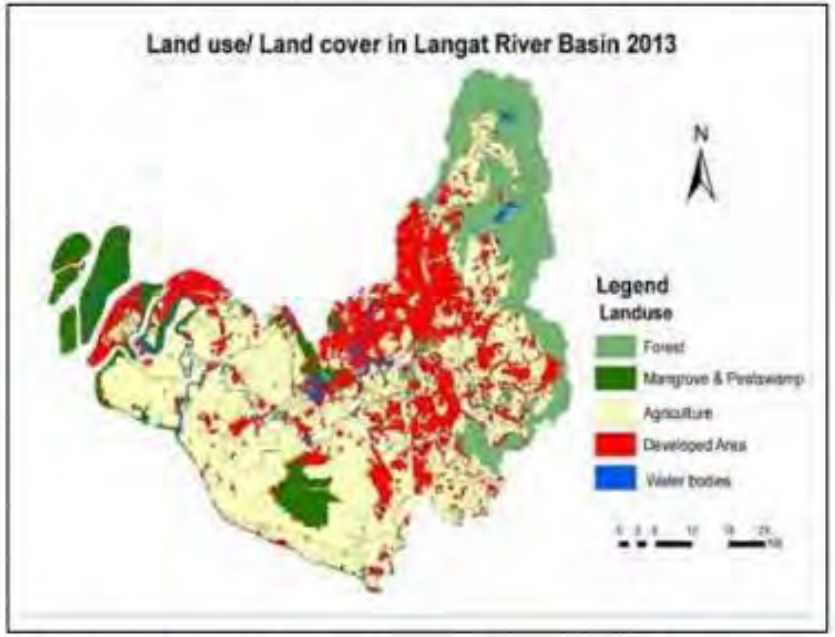
United Nations Educational, Scientific and Cultural Organization

Japan Funds-in-Trust

Overall Land Use Changes in LRB

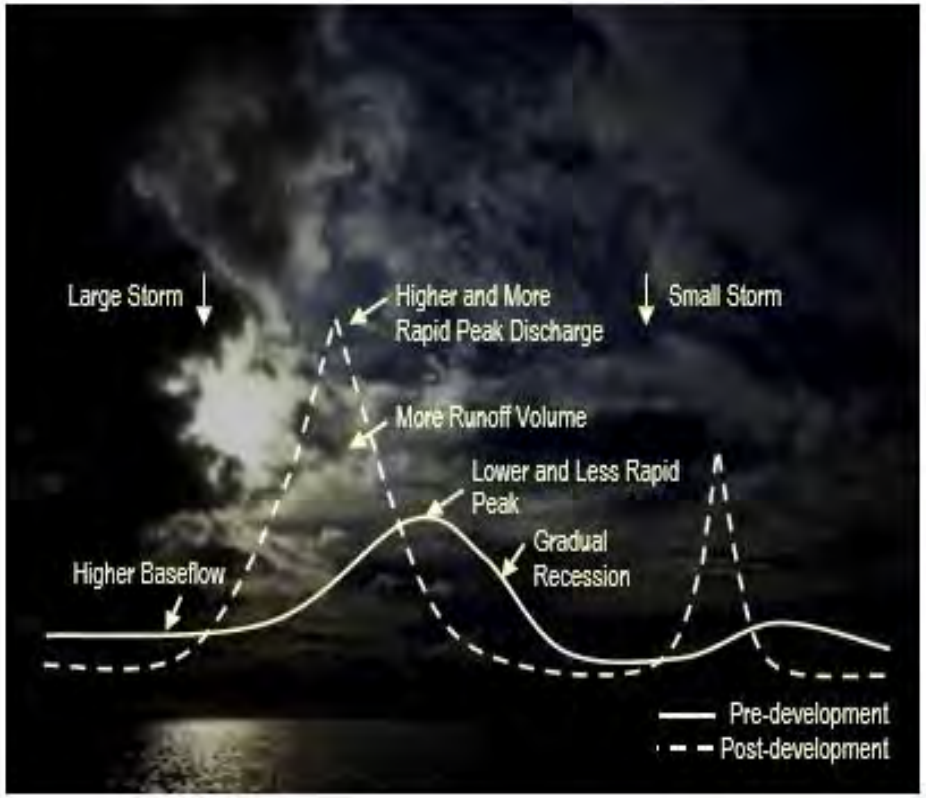
LESTARI
UNIVERSITI KEBANGSAAN MALAYSIA



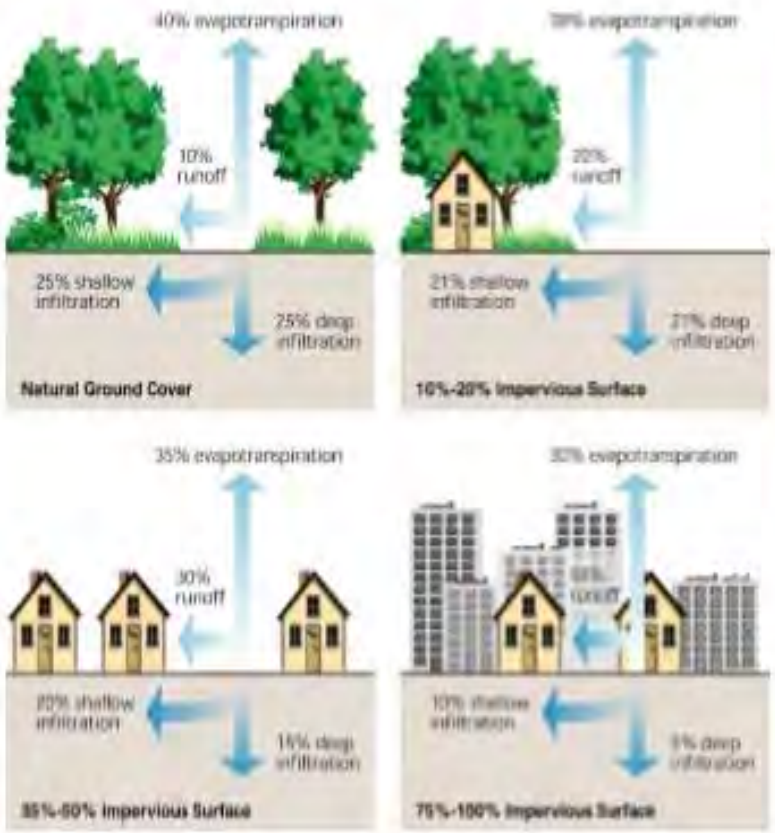


Land use Types	1974 (ha)	(%)	1991 (ha)	(%)	2001 (ha)	(%)	2013 (ha)	(%)
Forest	52,579.7	17.9	50,906.4	17.3	45,071.9	15.4	48,285.0	16.5
Mangroves & Peat swamp	75,252.6	25.7	37,014.5	12.6	25,630.7	8.7	27,560.8	9.4
Agriculture	155,249.0	52.9	170,705.0	58.2	164,841.0	56.2	142,387.916	48.5
Developed Area	7,022.8	2.4	28,510.7	9.7	51,502.8	17.5	69,056.1	23.5
Waterbody	3,267.3	1.1	6,401.5	2.2	6,207.1	2.1	6,009.113	2.0
Total	293,370.3	100	293,340.5	100	293,253.6	100	293,298.875	100

The science: Why current land development practices are a problem



Stormwater Hydrograph
Pre-development
Post Development



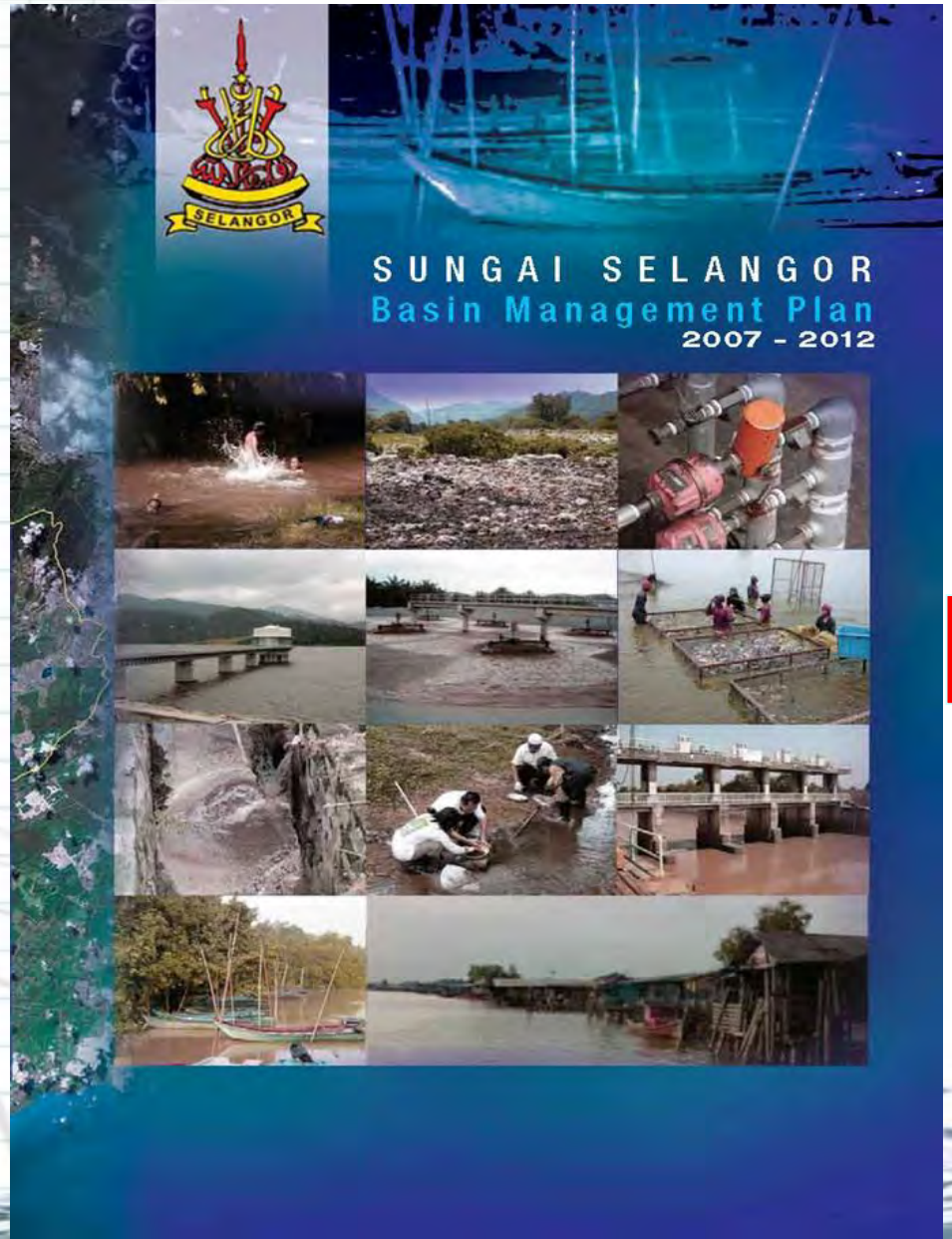
Impact of Impervious Surfaces

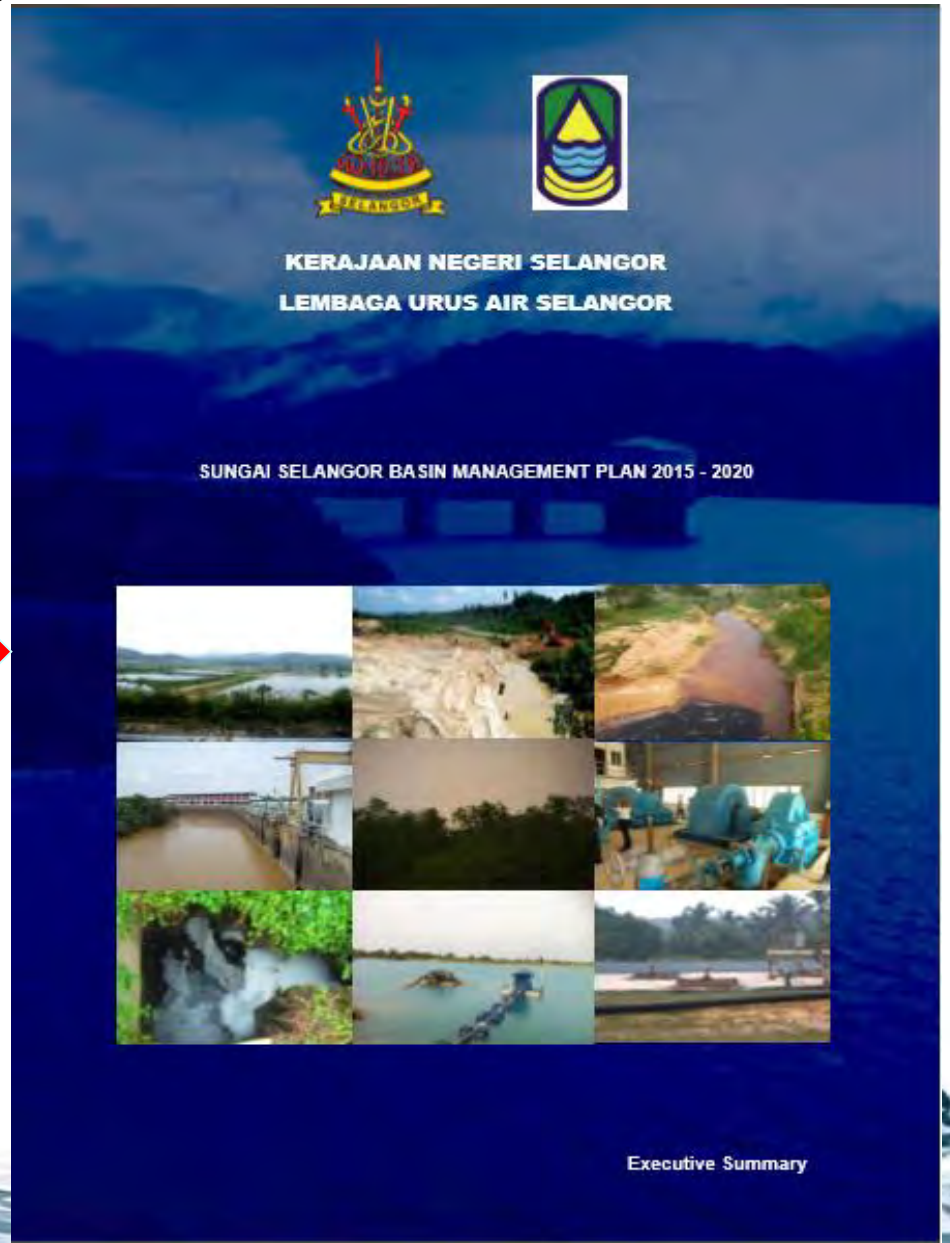
Impact on Hydrologic Cycle

Solution

- Basin management; basin modelling and planning
  - ✓ Ensure sufficient water
  - ✓ Ensure clean water
  - ✓ Reduce flood risks ⇒ Convert flood water to resource
  - ✓ Environmental enhancement
- Water resources infrastructure development
  - ✓ Optimising the existing infrastructure
  - ✓ New approaches or innovation; environmental friendly
- Consolidation and streamlining

River Basin Management Plan





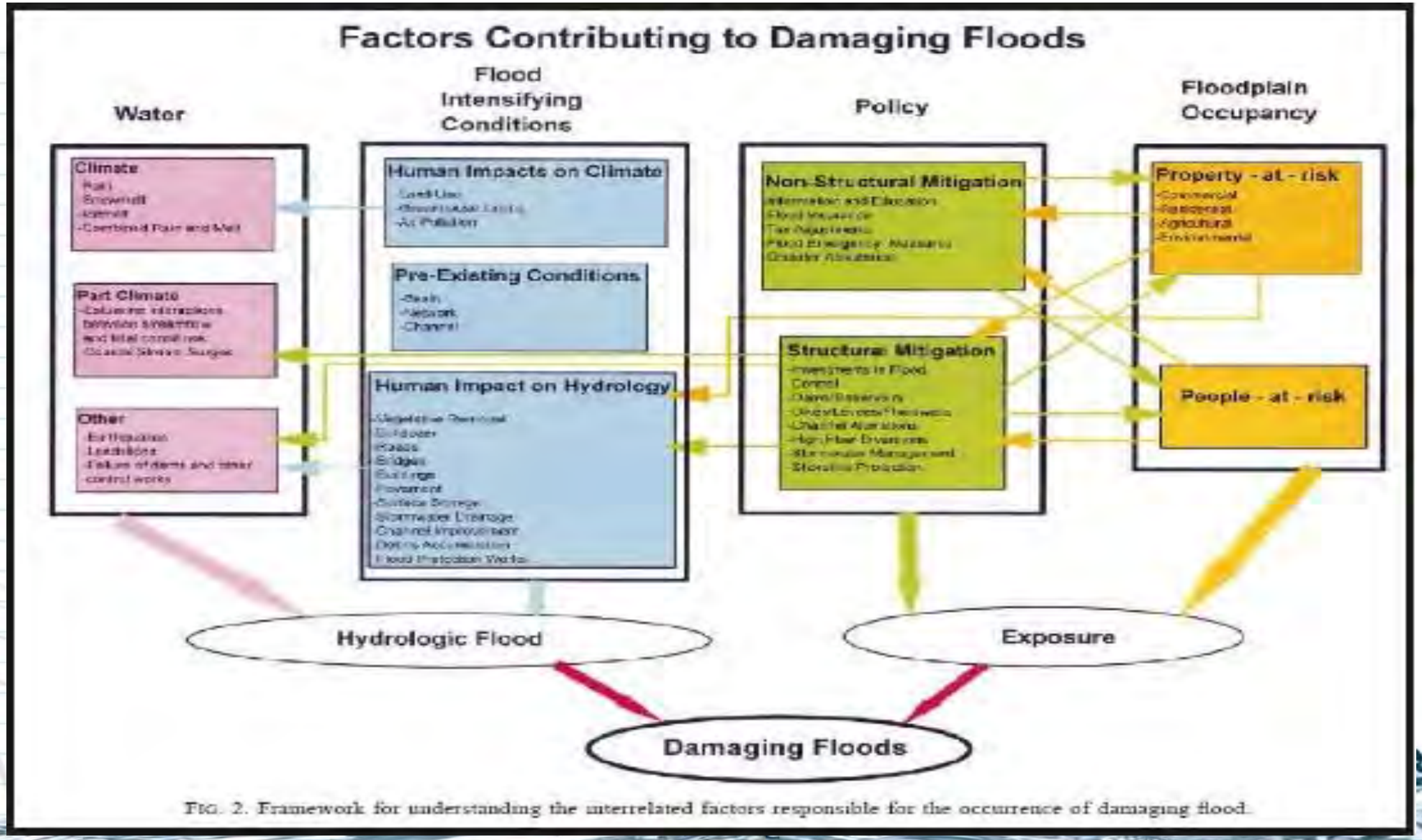
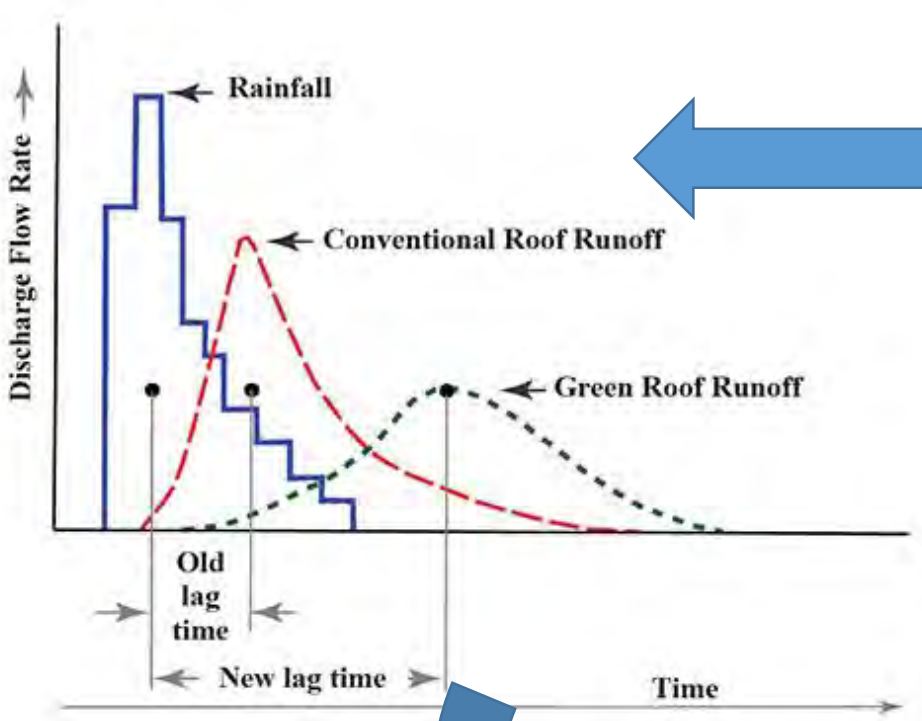
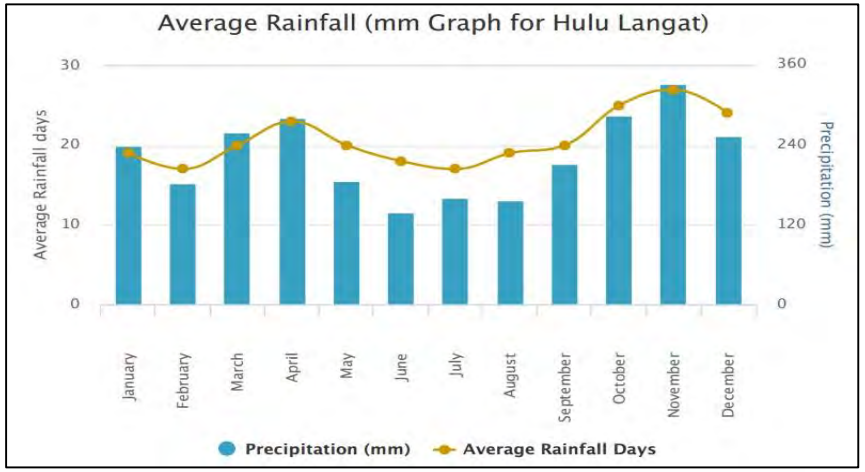
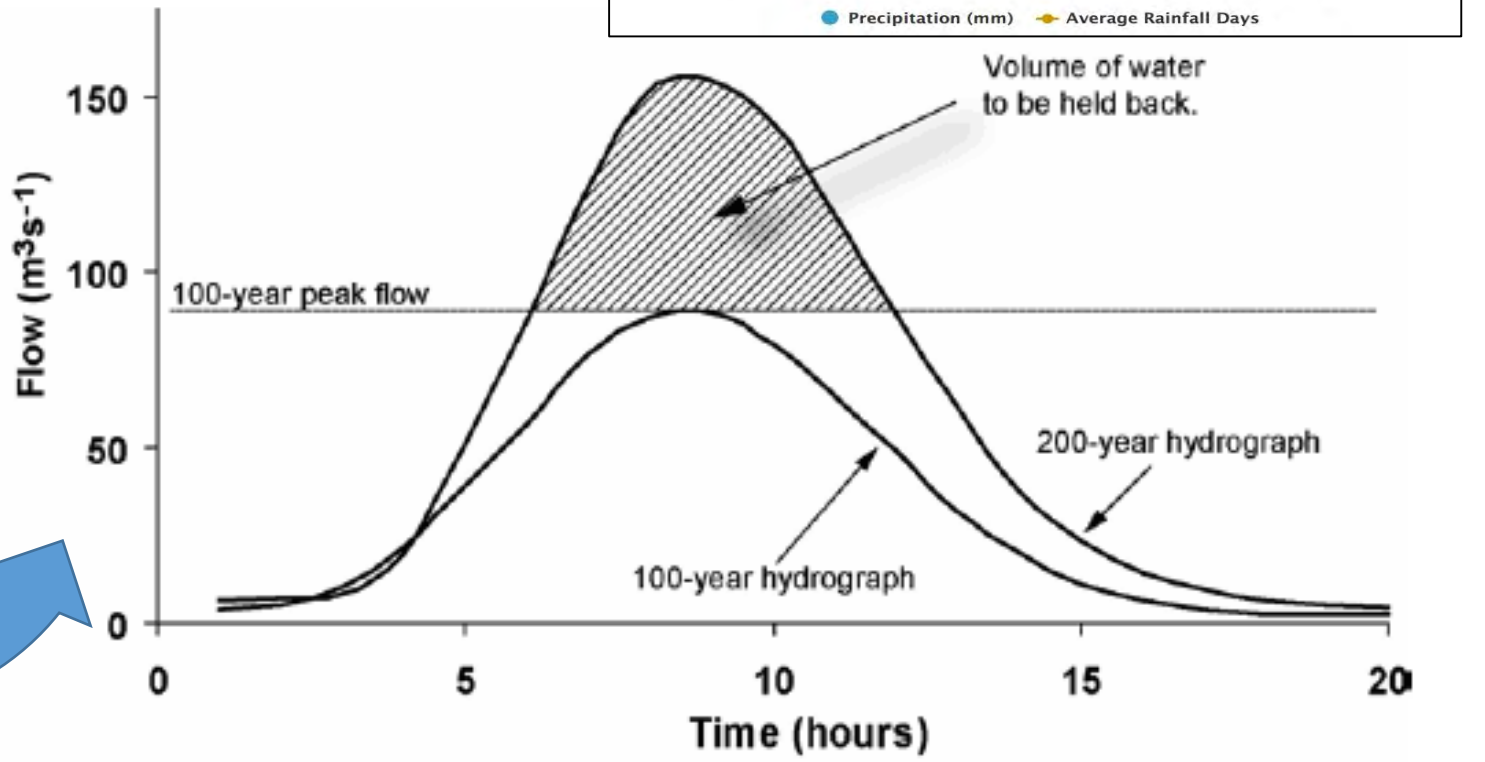


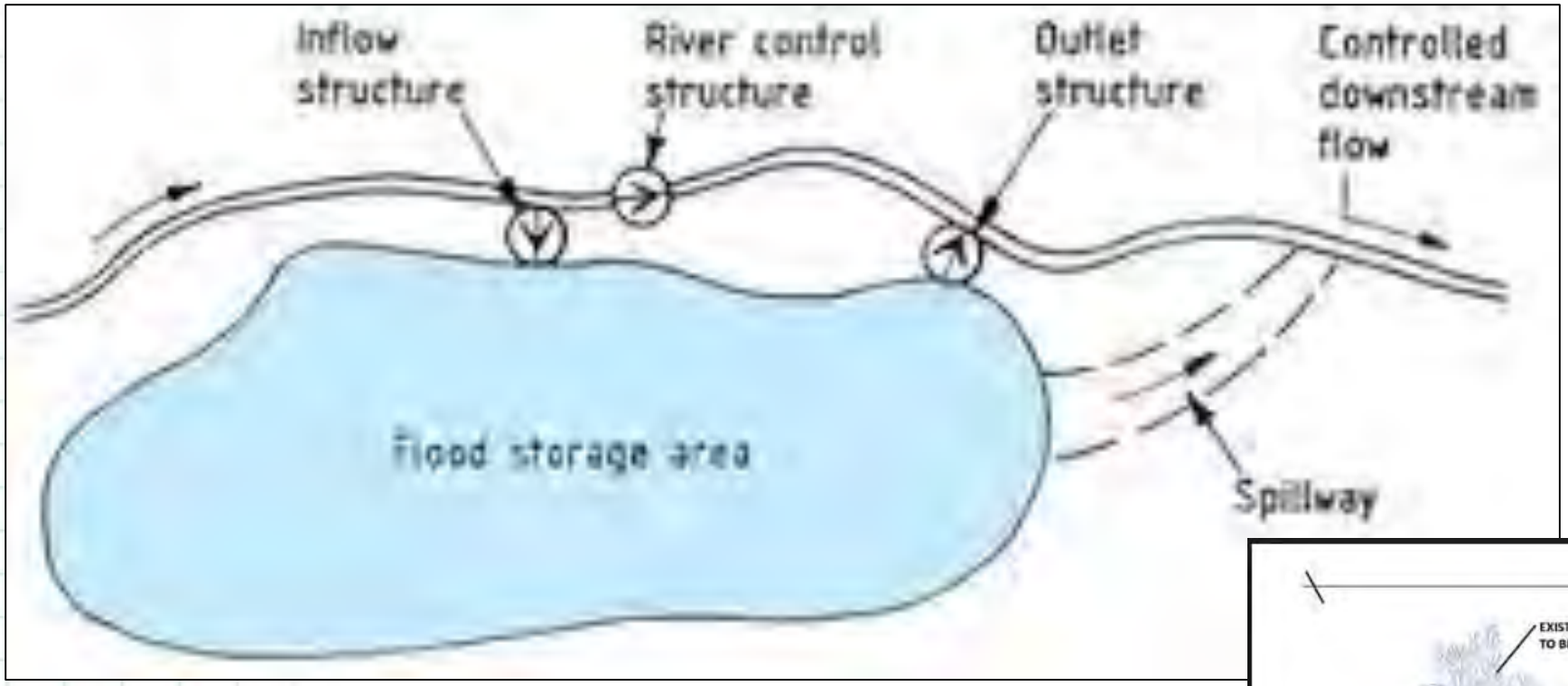
FIG. 2. Framework for understanding the interrelated factors responsible for the occurrence of damaging flood.

Managing flood water

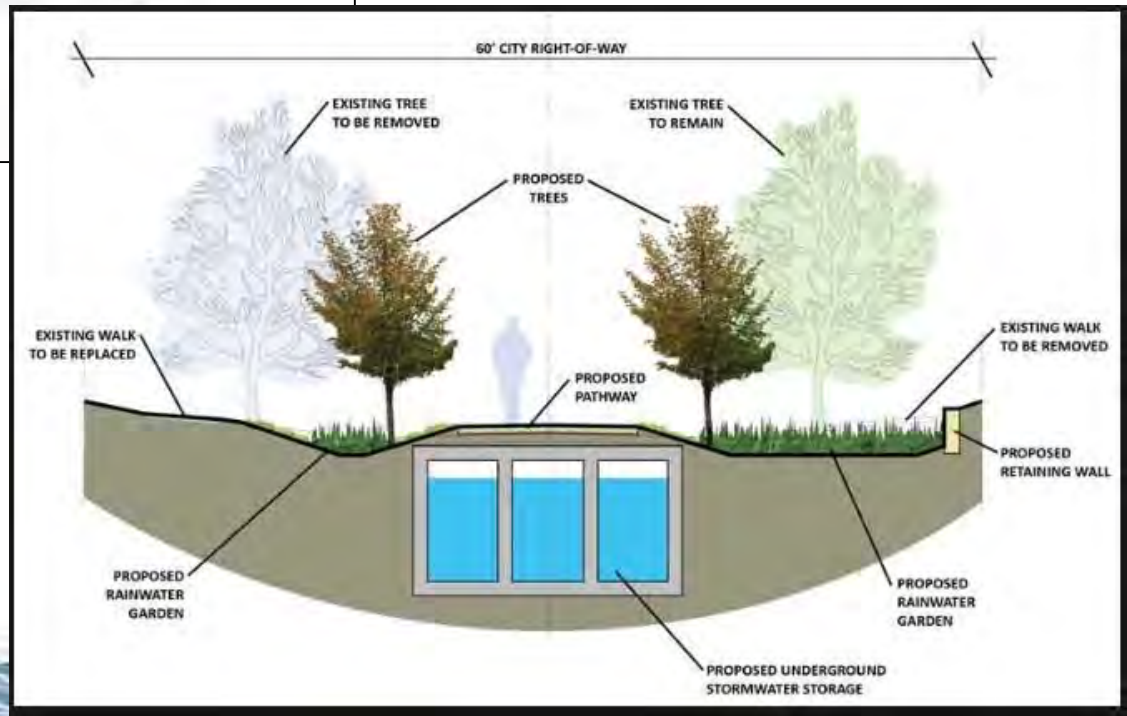








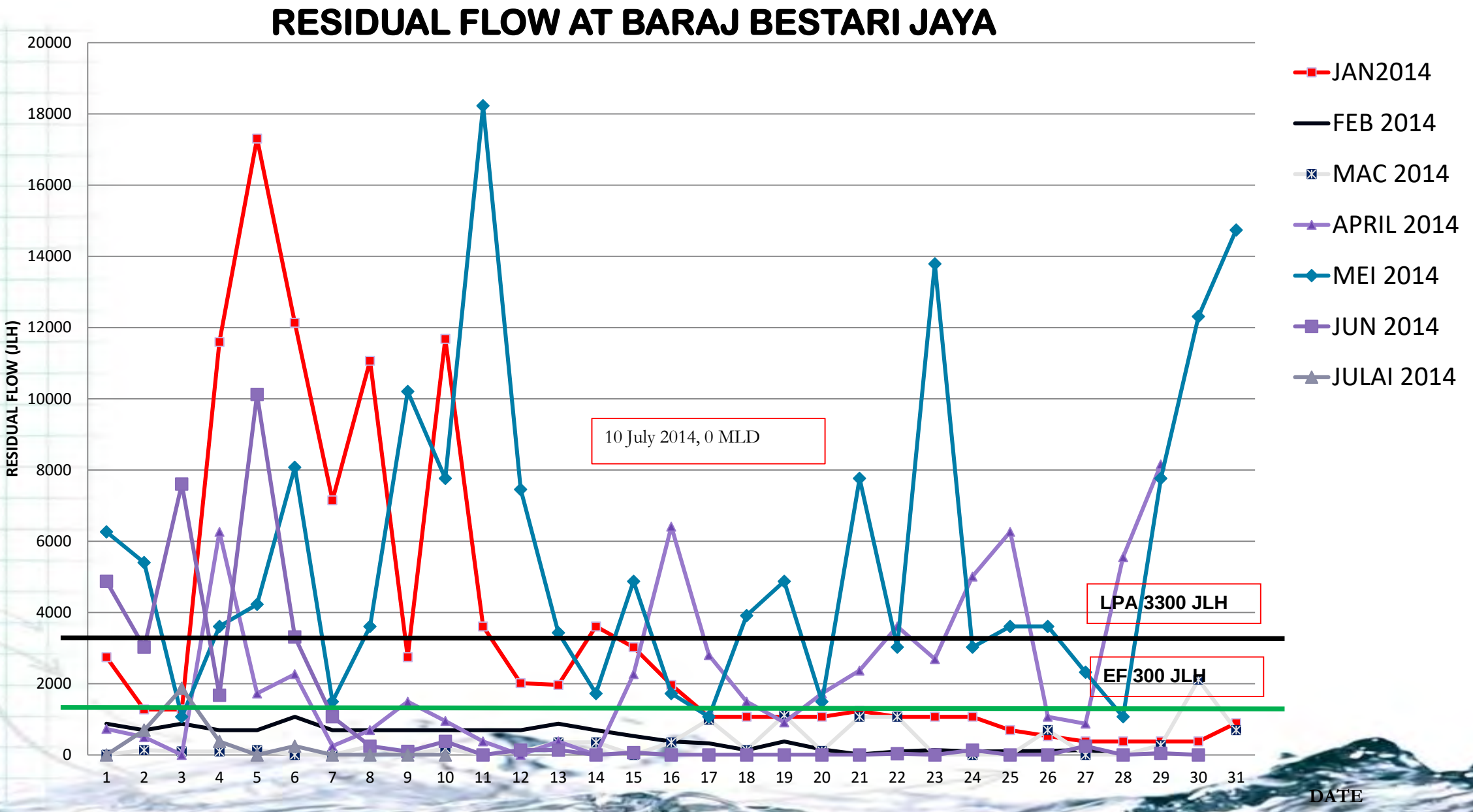
1. Increase water body area and volume
2. Adopt new approach
3. Regulate and peak flow control
4. Reduce flood risk, magnitude and damage

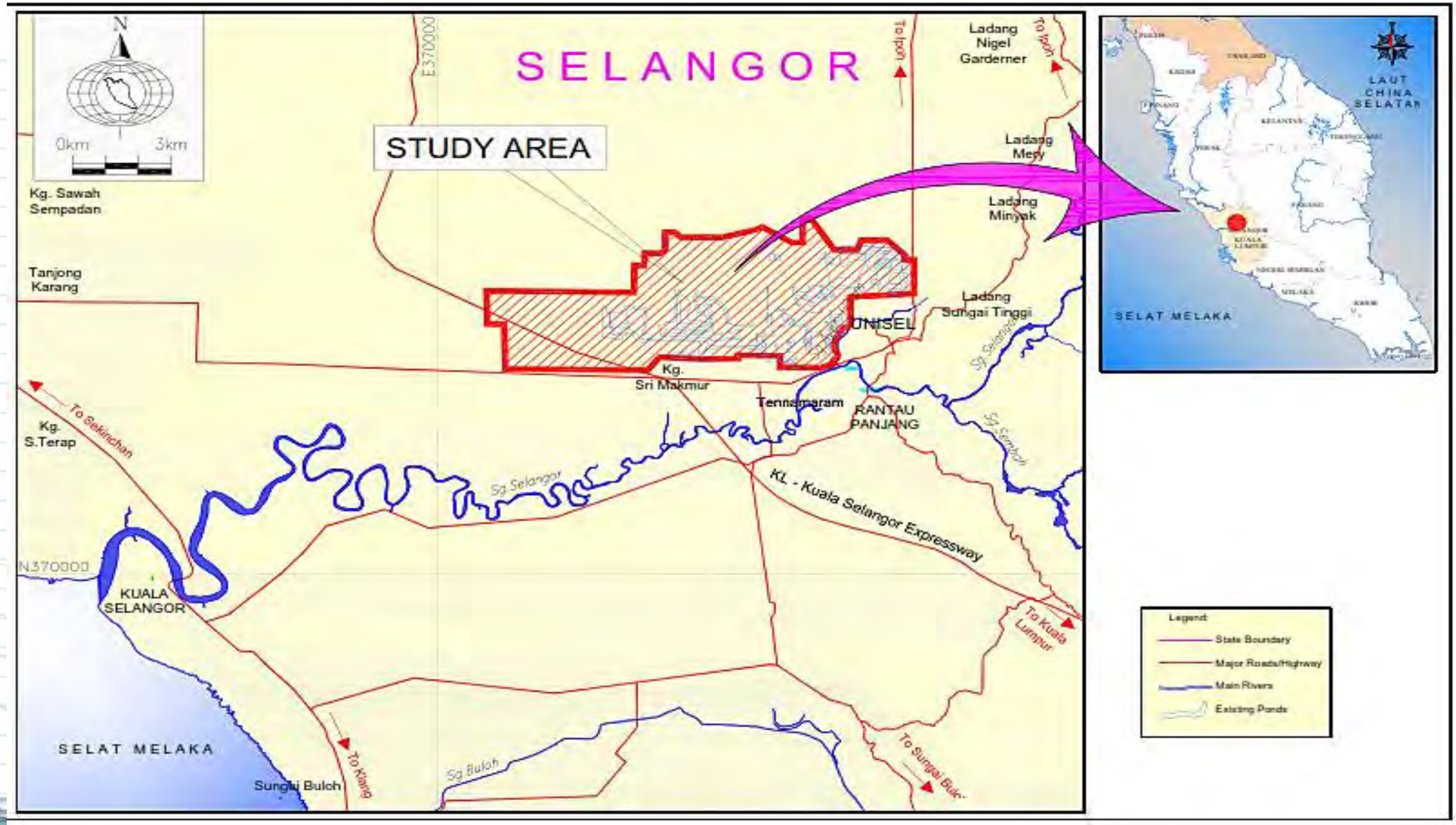


Annual rainfall – NWRS 2010

State	State Area (sq km)	Rainfall (mm)	Actual Evaporation (mm)	Groundwater Recharge (mm)	Surface Runoff (mm)
Perlis	821	1,880	1,290	120	470
Kedah	9,500	2,310	1,430	130	750
P Pinang	1,048	2,350	1,430	120	800
Perak	21,035	2,480	1,320	170	990
Selangor	8,396	2,190	1,280	150	760
Negeri Sembilan	6,686	1,830	1,210	130	490
Melaka	1,664	1,880	1,210	100	570
Johor	19,210	2,470	1,130	200	1,140
Pahang	36,137	2,470	1,250	120	1,100
Terengganu	**13,035**	**3,310**	**1,470**	**150**	**1,690**
Kelantan	15,099	2,600	1,290	140	1,170
West Malaysia	132,631	2,495.5	1,283.8	147.6	1,064.0
Sabah	73,631	2,560	1,190	190	1,180
Sarawak	124,450	3,640	1,250	240	2,150
FT Labuan	91	3,100	1,480	150	1,470
East Malaysia	198,172	3,238.5	1,227.8	221.4	1,789.3
Malaysia	**330,803**	**2,940.6**	**1,250.3**	**191.8**	**1,498.5**

State	Area Sq km	Total water demand (mm)					Effective rainfall (mm)	Excess / Shortage (mm) – Uncontrolled flow				
		2010	2020	2030	2040 40%	2050 46%	14%	2010	2020	2030	2040	2050
Perlis	**821**	**372.3**	**364.2**	**348.0**	**345.5**	**342.3**	**71**	**(302)**	**(294)**	**(277)**	**(277)**	**(272)**
Kedah	**9,500**	**307.6**	**313.2**	**299.1**	**302.4**	**302.8**	**113**	**(195)**	**(201)**	**(187)**	**(190)**	**(190)**
Pulau Pinang	**1,048**	**729.4**	**791.3**	**797.5**	**834.4**	**853.2**	**120**	**(609)**	**(671)**	**(677)**	**(714)**	**(733)**
Perak	21,035	92.7	91.6	85.5	85.6	86.1	140	47	48	54	54	53
Selangor	**8,396**	**266.6**	**296.6**	**306.0**	**328.7**	**348.0**	**114**	**(153)**	**(183)**	**(192)**	**(215)**	**(234)**
Negeri Sembilan	6,686	51.0	54.1	53.6	54.7	56.0	74	23	19	20	19	18
Melaka	**1,664**	**193.9**	**220.1**	**225.9**	**246.0**	**263.4**	**86**	**(108)**	**(135)**	**(140)**	**(161)**	**(178)**
Johor	19,210	37.2	45.8	53.8	60.6	67.7	171	134	125	117	110	103
Pahang	36,137	20.1	26.2	24.8	25.2	26.5	165	145	139	140	140	138
Terengganu	**13,035**	**67.8**	**74.8**	**74.4**	**76.7**	**78.7**	**254**	**186**	**179**	**179**	**177**	**175**
Kelantan	15,099	108.1	107.2	105.0	106.0	106.2	176	67	68	70	70	69
Pen Malaysia	132,631	96.5	103.1	102.2	105.9	109.2	159	62	56	57	53	50
Sabah	73,631	12.4	18.4	18.9	19.6	20.0	177	165	159	158	157	157
FT Labuan	91	197.7	264.3	285.0	304.0	318.0	323	125	58	37	19	4
Sarawak	124,450	8.4	17.3	17.0	17.5	18.0	221	212	203	203	203	202
East Malaysia	198,172	10.0	17.9	17.9	18.4	18.9	269	258	251	251	250	250
Total Malaysia	330803	44.7	52.0	51.7	53.5	55.1	225.0	180.3	173.0	173.3	171.5	169.9


RESIDUAL FLOW AT BARAJ BESTARI JAYA
RESIDUAL FLOW (JLH)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
DATE
JAN2014
FEB 2014
MAC 2014
APRIL 2014
MEI 2014
JUN 2014
JULAI 2014
10 July 2014, 0 MLD
LPA 3300 JLH
EF 300 JLH


SELANGOR
STUDY AREA
N
0km
3km
E370000
N370000
To Ipoh
Ladang Nigel Garderner
Ladang Mesy
Ladang Minyak
Ladang Sungai Tinggi
UNISEL
Kg. Sawah Sempadan
Tanjong Karang
Kg. Sri Makmur
Tennamaram
RANTAU PANJANG
Kg. S.Terap
To Sekinchan
Sg.Selangor
Sg.Sembah
KL - Kuala Selangor Expressway
To Kuala Lumpur
KUALA SELANGOR
SELAT MELAKA
Sungai Buloh
To Klang
Sg Buloh
To Sungai Buloh
LAUT CHINA SELATAN
SELAT MELAKA
Legend
State Boundary
Major Roads/Highway
Main Rivers
Existing Ponds


GAMBAR 1


GAMBAR 2


GAMBAR 3


GAMBAR 4


GAMBAR 5


GAMBAR 6

GAMBAR 7

GAMBAR 8


GAMBAR 9


GAMBAR 10


CRM 1
GAMBAR 11

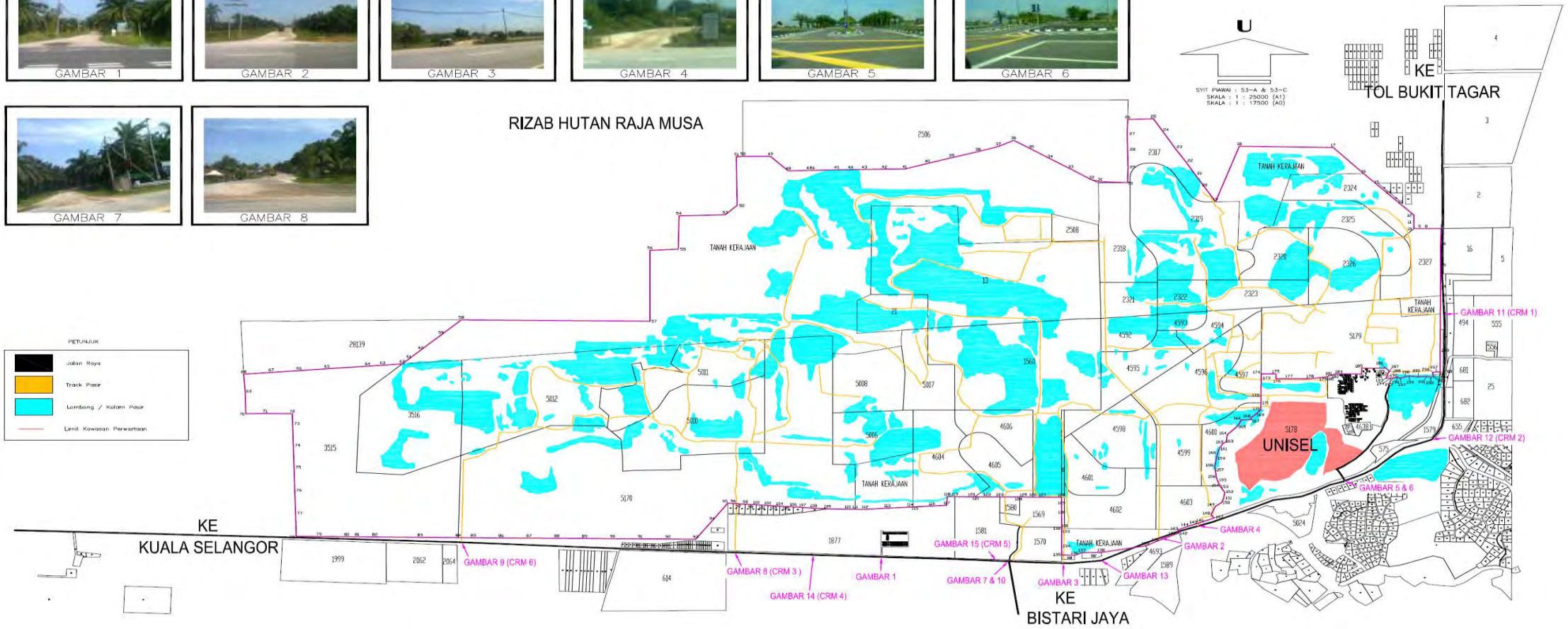

CRM 2
GAMBAR 12


CRM 3
GAMBAR 13


CRM 4
GAMBAR 14


CRM 5
GAMBAR 15


CRM 6
GAMBAR 16



Downstream storage

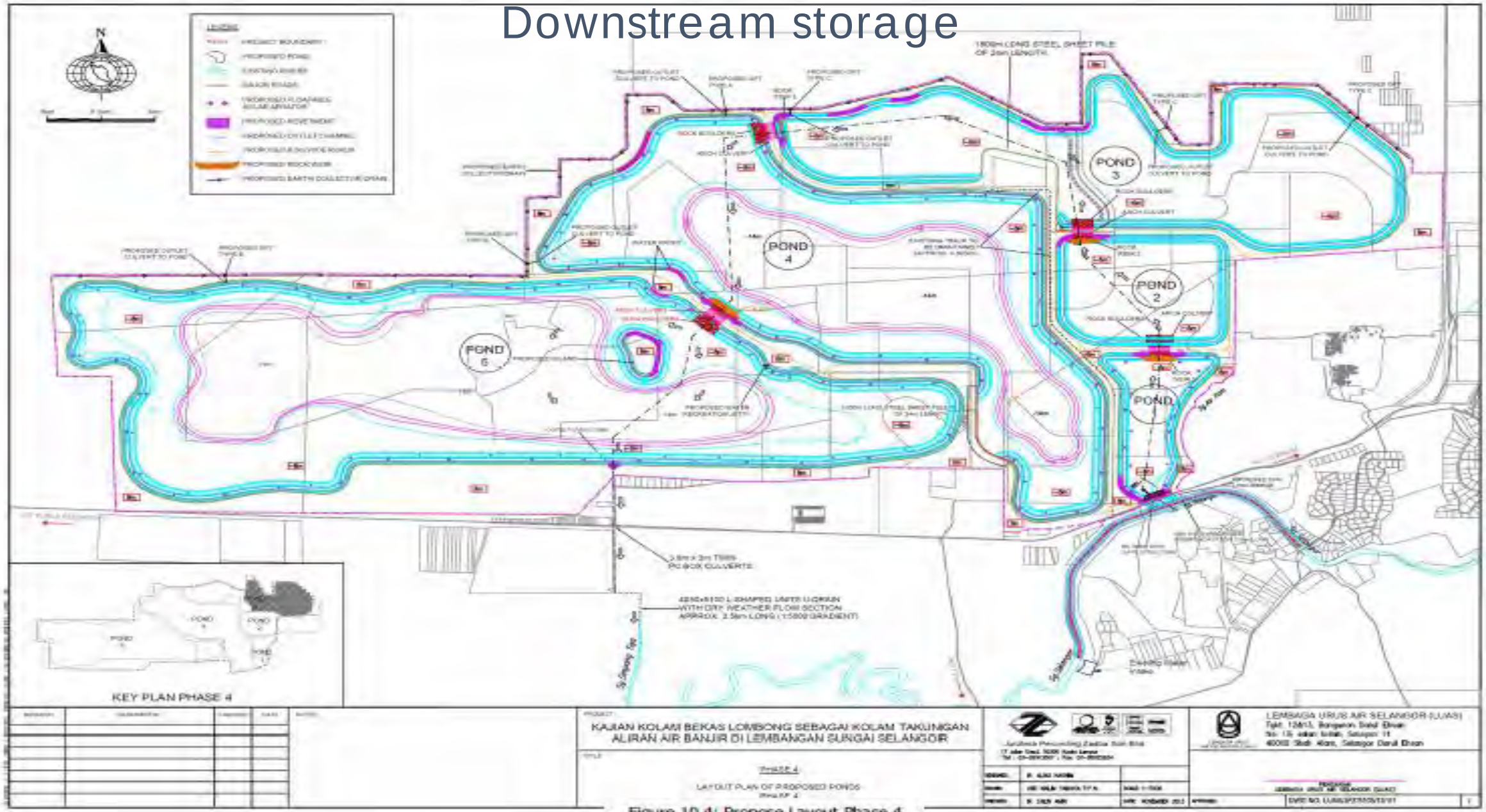
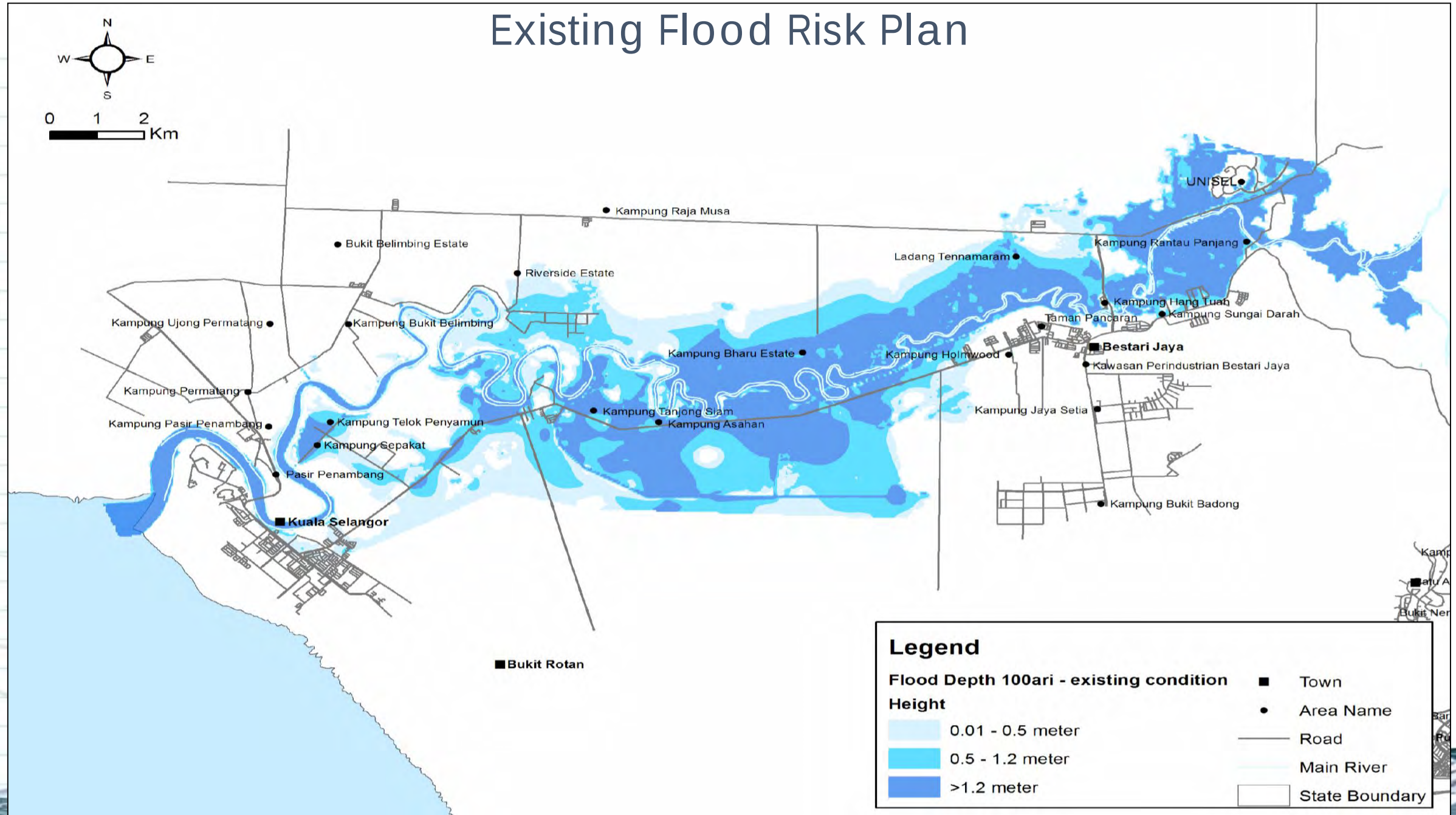
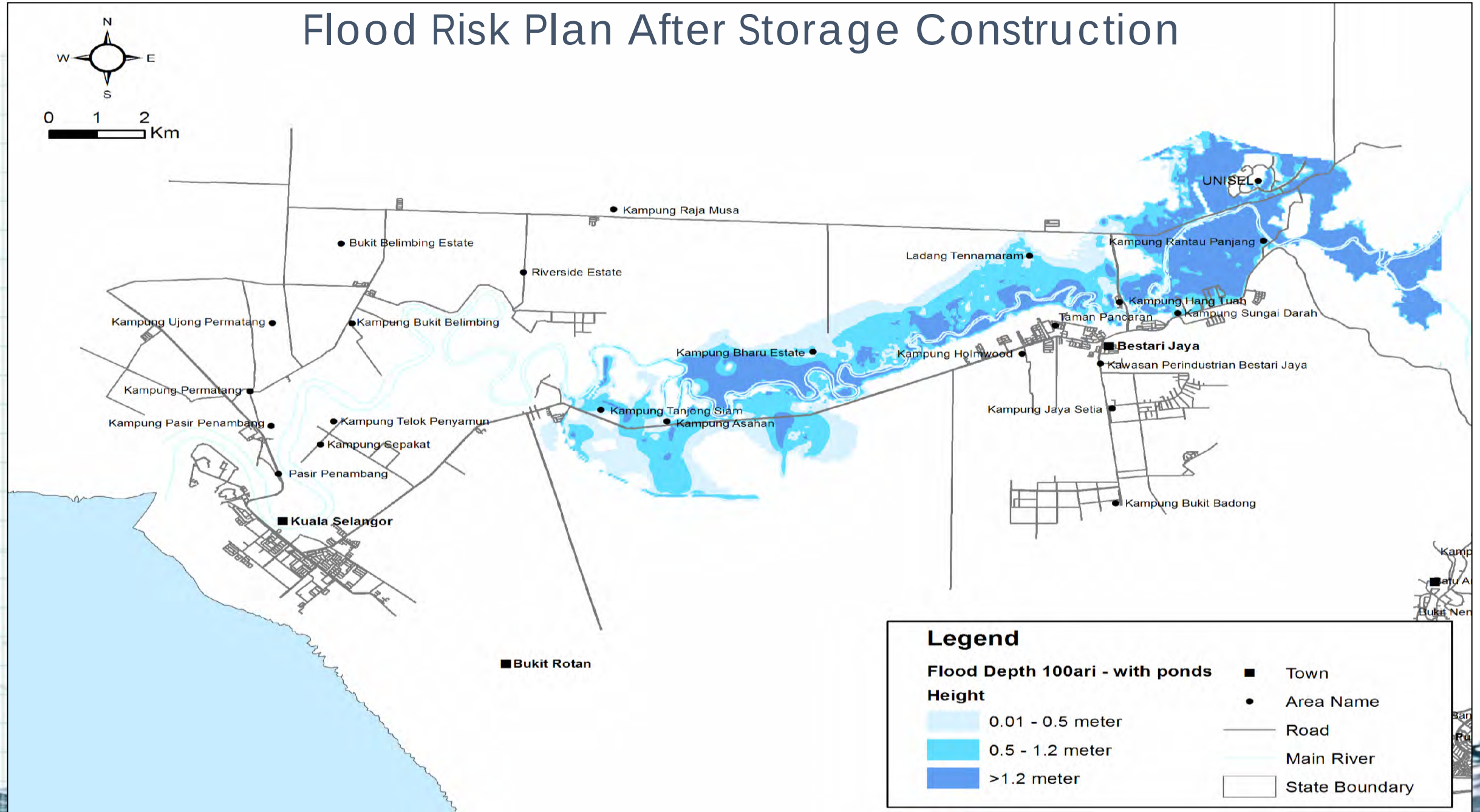


Figure 10.4: Propose Layout Phase 4

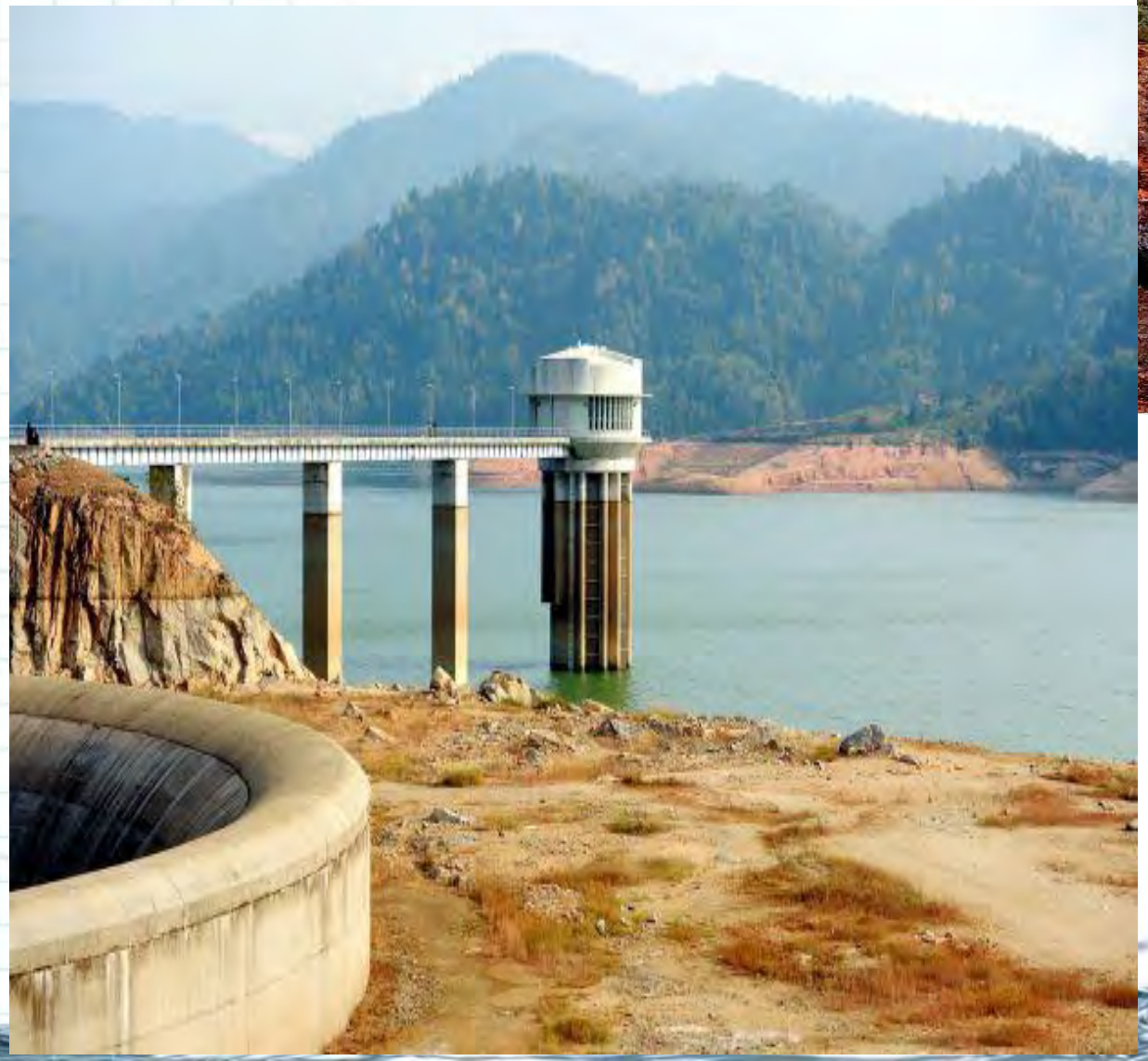
Existing Flood Risk Plan

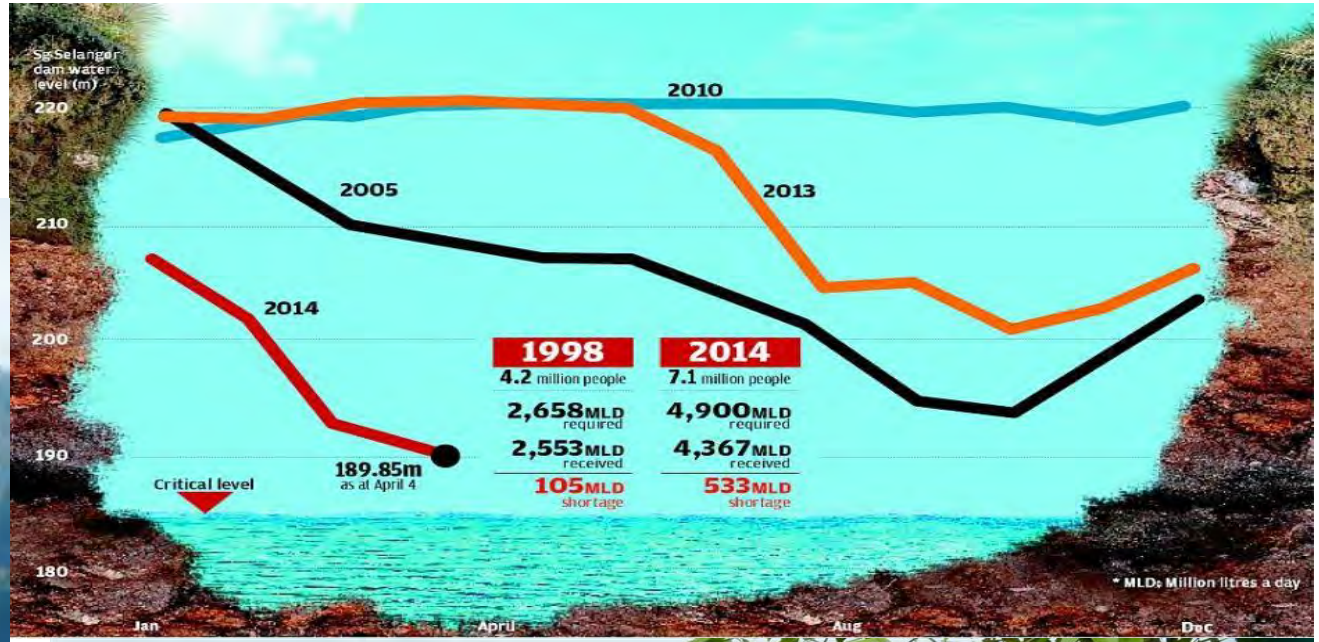


Flood Risk Plan After Storage Construction



Selangor River





Back to nature - retrofit

Our river @ 2019

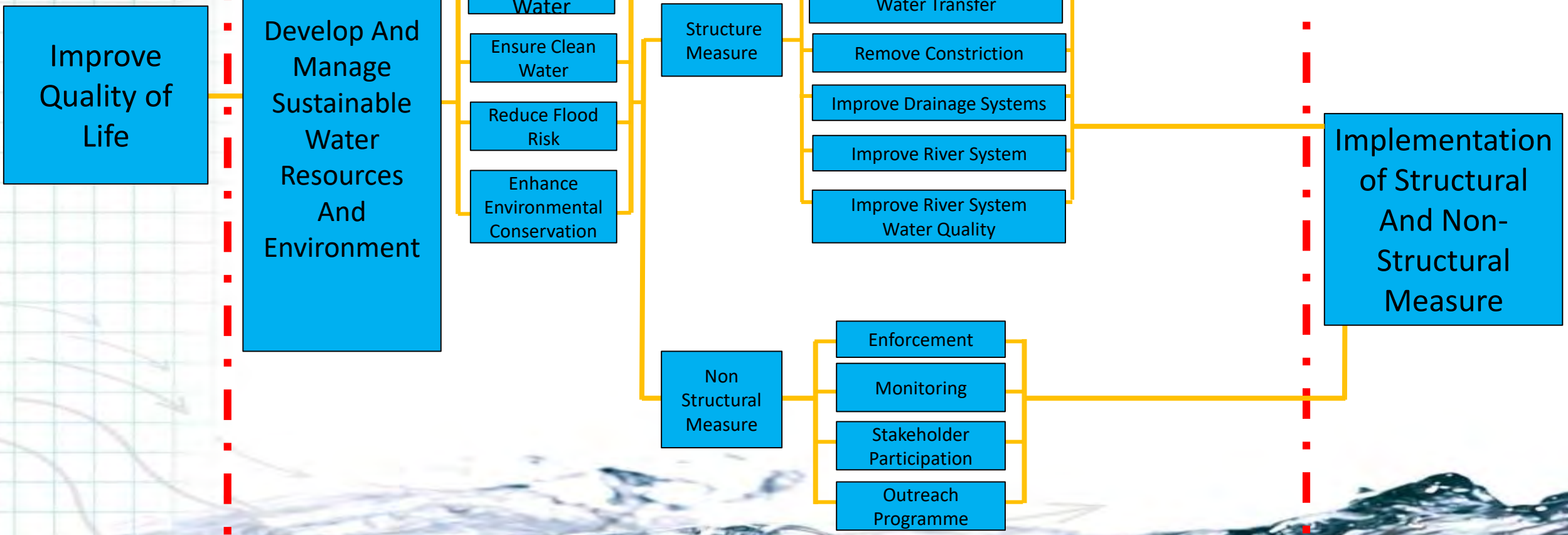
Can we ???? @ 1966

- Provide environmental friendly area;
  - Reduce hardscape, more softscape (green)

FAST DIAGRAM – TOTAL SOLUTION BY INTEGRATED RIVER BASIN MANAGEMENT (IRBM)

FASA ANALISA FUNGSI

HOW → ← WHY



Conclusion

- Water resources as national agenda; development and investment
- Solving for the future; planning and implementation
  - ✓ New approaches, integrate water related project
  - ✓ More innovative solution
- Basin management is extremely complex, conflict
- Water security and build climate resilience
- Management of basins in growing urban centres


Thank You
2 11:16 AM