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Adaptive Capacity of the Water Institutions in a Changing Climate: The Case of Selangor River Basin

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Why Studying Adaptive Capacity of the Water Institutions

- To understand what influences the ability of institutions to adapt to climate change.
- Such ability is one main factor affecting adaptive capacity of other actors in the water sector to climate change
- To gain insight into ways to enable successful adaptation; as higher adaptive capacity only provides a higher likelihood for adaptation
- Critical to managing uncertainty of CC , thus flexible and adjustable decision-making

Adaptive Capacity in the Water Sector: Definitions & Key Elements

Definition of adaptive capacity

- Specific to the context of respective study: governance, institutional, socio-economic, public management, river basin & ecosystem, local level, etc
- Mainly surrounds water availability issues
- Generally refers to the capacity to adapt to climate change, where such ability may be the inherent characteristics of the system concerned and/or the capabilities to influence response by other actors

Key elements of adaptive capacity

- Multiple elements were used to either qualitatively or quantitatively determine the potential of the system concerned in adapting to climate change.
- Such elements range from institutional, technological, regulatory, cultural, financial to governance factors.
- Most works further break each element into one to several sub-elements.

Assessment of Adaptive Capacity of the Water Sector in Malaysia

ADB Study (1994), INC (2000), NC2 (2010)

- Impact assessment approach: future climatic stimuli → exposure and sensitivity of water sector → adaptation options (water management measures)
- Limited consideration on the sector's adaptive capacity (current or future) to cope with future climate change
- Why? → uncertainty in future projection + assessment of adaptive capacity only emerged as a critical focus of attention as observed in the IPCC-AR3.

Other studies since INC

- CC implications on existing and future water resource system on a basinal basis
- examine the biophysical sensitivity of the basins under the exposure to projected future climate
- may be inadequate to gain insight on their current adaptive capacity and whether such adaptability will transform or facilitate actual adaptation in the future.

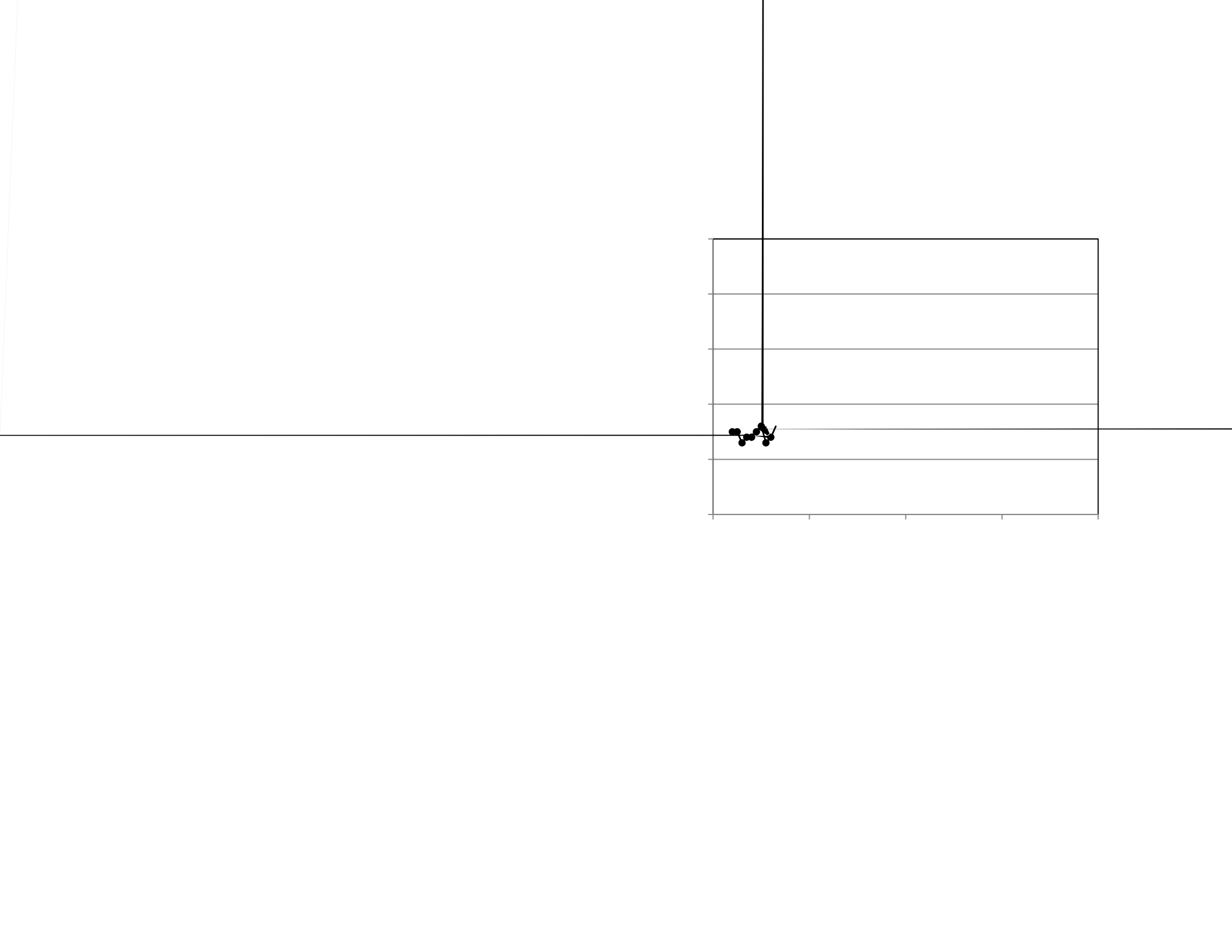
Selangor River Basin



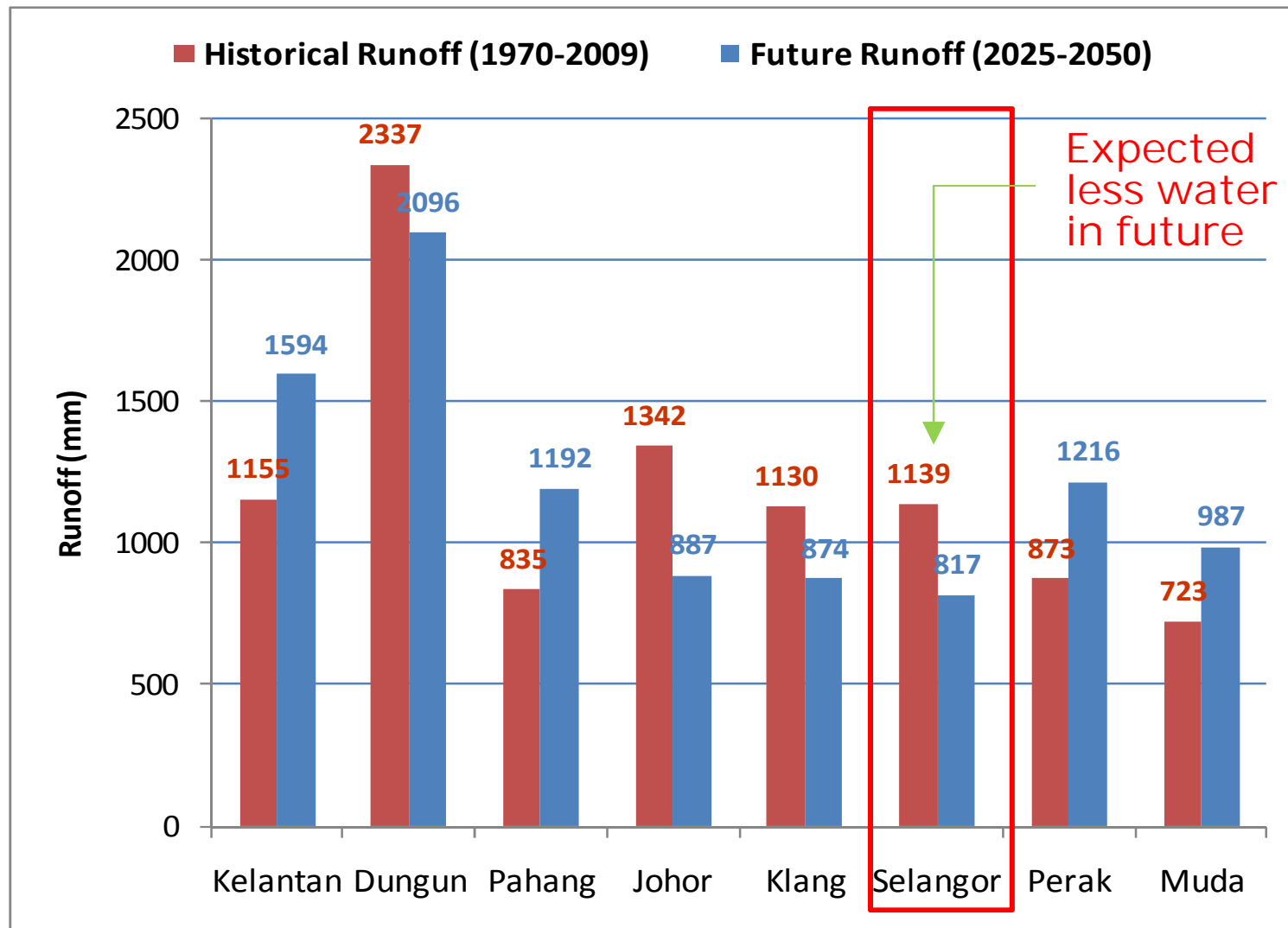
Source: LUAS (2011)

- Total length: ~110km.
- One of the three main basins in Selangor.
- Provides 60% of domestic and industrial water supply in Selangor and Klang Valley
- Vulnerable ecosystems: firefly in Kg. Kuantan and Kuala Selangor Nature Park

- Information on future hydroclimate conditions – NAHRIM 2006 study:
 - Downscaled from one GCM only.
 - Disconnected simulation data.
 - One station along Selangor River.



Comparison of Historical & Future Water Availability



Source: Ahmad Jamalludin (2011)

Identifying the Determinants of Adaptive Capacity

Method:

- literature review & expert judgement, iteratively

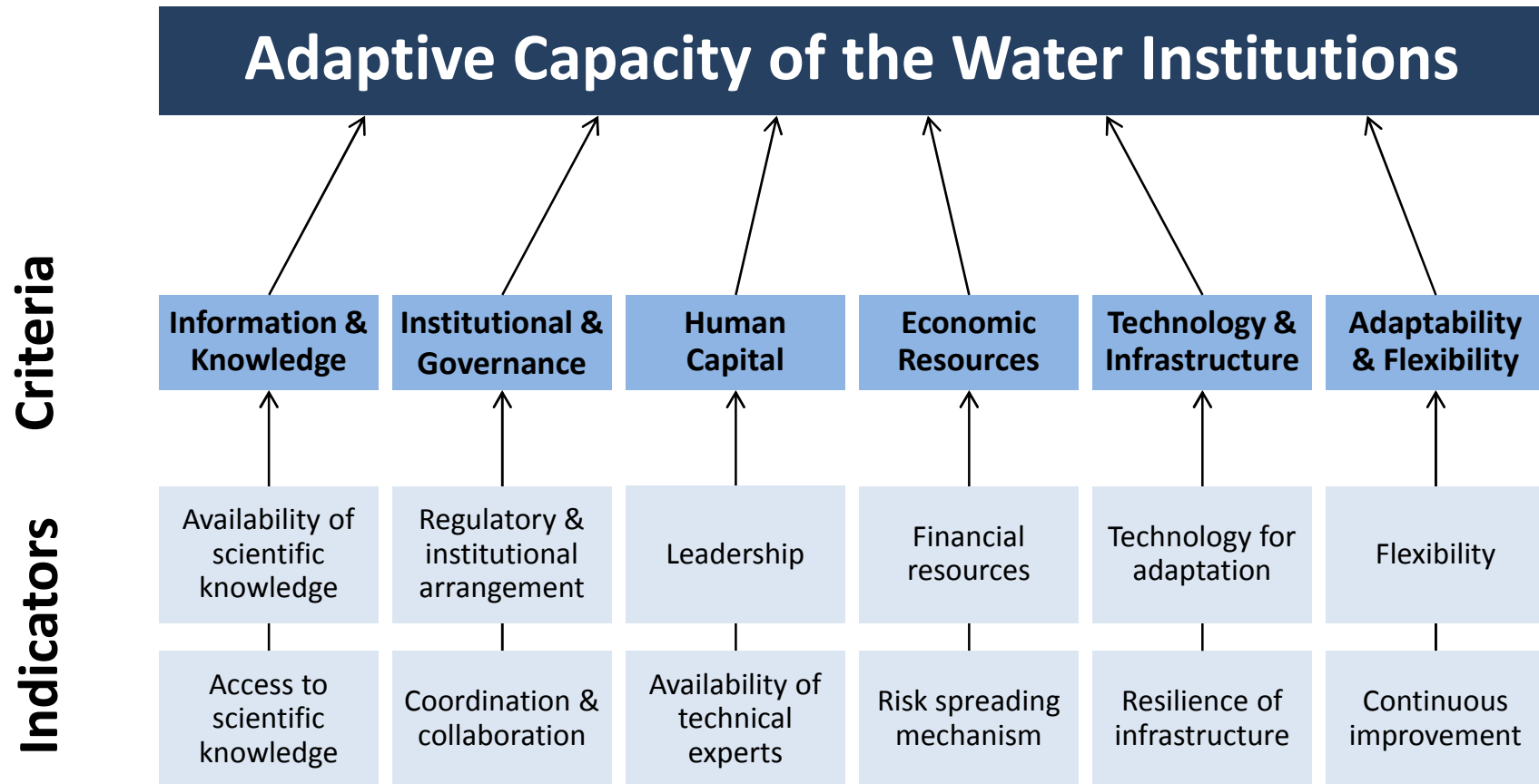
Approach:

- inductive approach (detailed review of literature to derive concepts, themes or models through interpretations of the materials)

Literature:

- WRM and CCA, with focus on adaptive capacity surrounding issues related to governance, institutions, organisational management, strategy formulation & implementation, etc.
- Publications (mainly journal articles) from 2011-2012

Adaptive Capacity Assessment Framework



Representation of Indicators (1)

Criteria	Indicator	Representation
1. Information & Knowledge	1.1 Availability of scientific knowledge	Institutional knowledge of the current vulnerabilities and potential impacts.
	1.2 Access to scientific knowledge	Access to scientific knowledge and effective communication with experts, including scientific results.
2. Institutional & Governance	2.1 Regulatory & institutional arrangement	Governance structure that facilitate rapid and innovative decision-making as well as effective actions by the institution.
	2.2 Coordination & collaboration	Cooperation with various stakeholders outside the institution's hierarchy and access to networks at various scales.
3. Human Capital	3.1 Leadership	Recognition by higher governance level and proactive and take ownership of adaptation.
	3.2 Availability of technical expertise	Availability of in-house human resources with relevant technical skills, knowledge and experience.

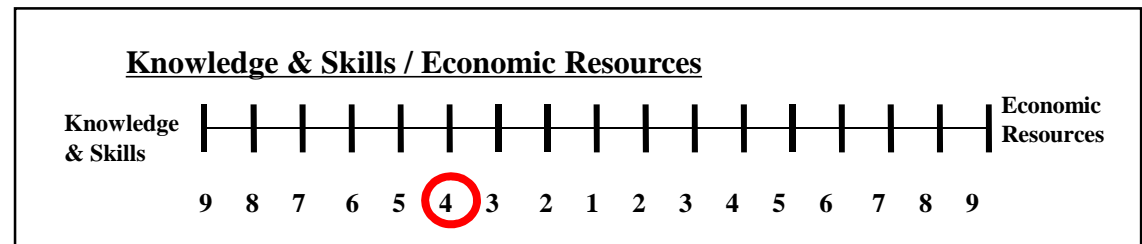
Representation of Indicators (2)

Criteria	Indicator	Representation
4. Financial Resources	4.1 Financial resources	Availability of or access to sufficient income or the ability to generate resources to support policy measures and financial incentives for adaptation.
	4.2 Risk spreading mechanism	Ability to access and subscribe to relevant mechanism to spread or reduce the risks of climate change.
5. Technology & Infrastructure	5.1 Technology for adaptation	New technologies or revival of old ones in response to new conditions under uncertain future climate conditions.
	5.2 Resilience of infrastructure	Existing infrastructure and future investments integrate climate change factor and are climate-proved.
6. Adaptability	6.1 Flexibility	Openness towards uncertainties patterns and ability to update or adjust in a non-stationary climate.
	6.2 Continuous improvement	Ability to find innovative solutions and make changes to policies, processes, practices and behaviour that will lead to better performance.

Structured Survey

Weightage of criteria

- Analytic Hierarchical Process (AHP)
- Relative importance between criteria
- Pairwise comparison: 1 to 9



Scoring of indicators

- Extent of activities being practised by the institutions

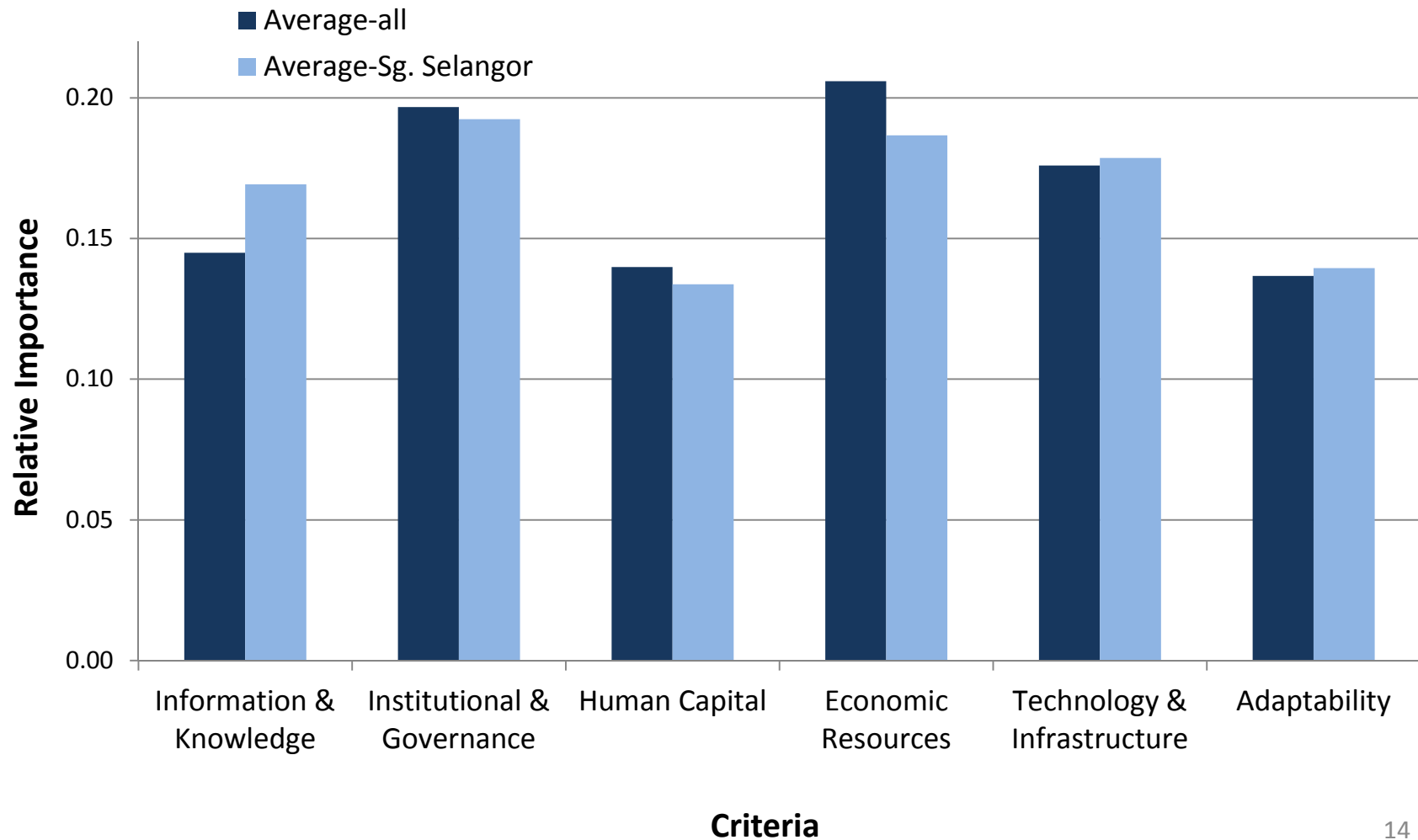
Targets:

- Experts with experience on water issue
- Number of institutions: > 45 (targeted final responses > 30 with experience on Sg. Selangor Basin)
- Initial list to be compiled from CC documents (NCs) / events (presenters), then snowball technique

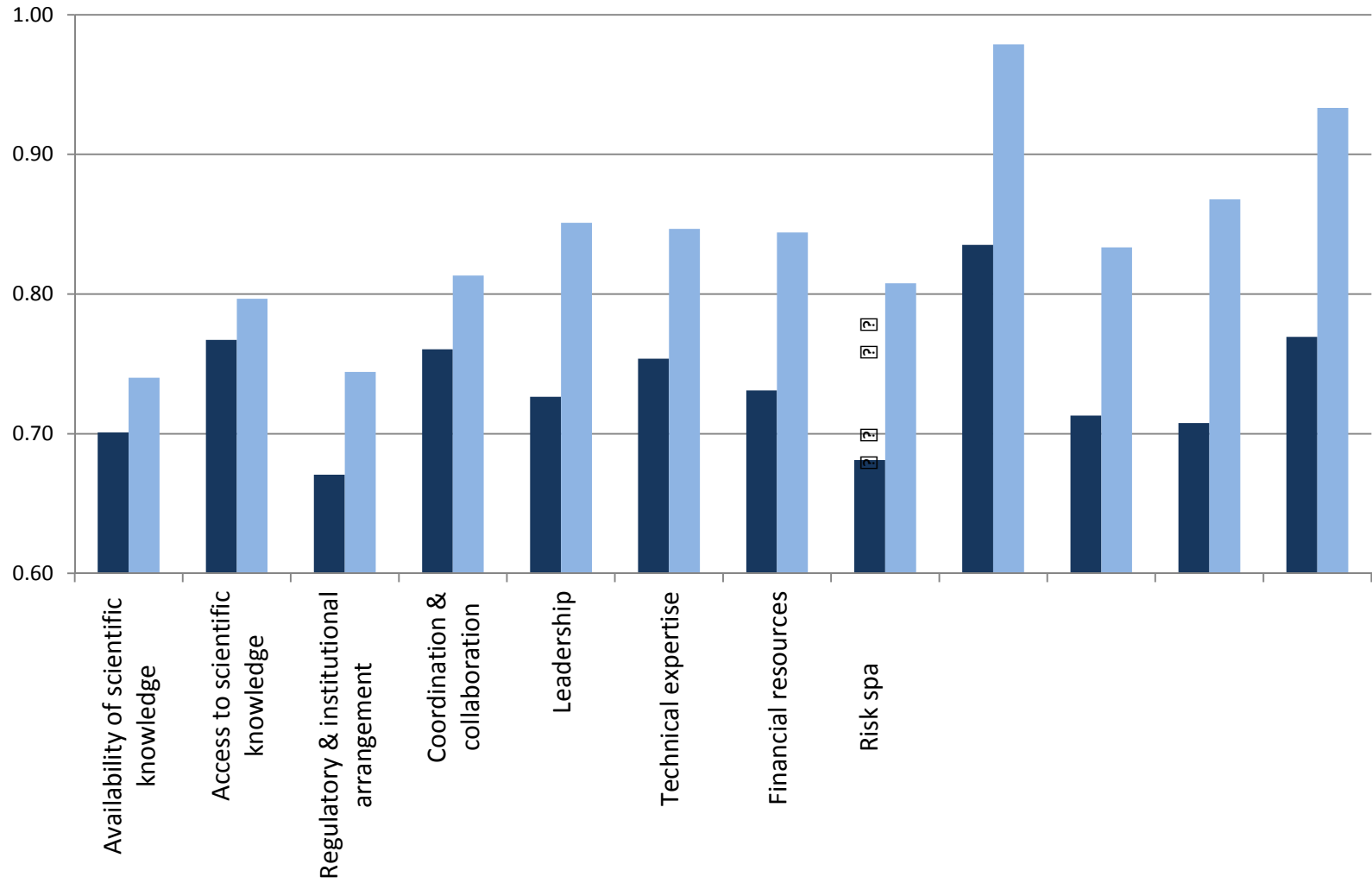
Targeted Stakeholders & Respondents

Stakeholder Group	Targets	Responses (as of Feb 2013)		
		Overall	With Experience on Sg. Selangor	
Federal level	~30	12	4	5: < 5 years 6: 5-10 years 3: > 10 years
State level	~35	8	3	
Local level	~10	3	2	
Others	~30	7	5	
TOTAL	~105	30	14	

Relative Importance of the Criteria

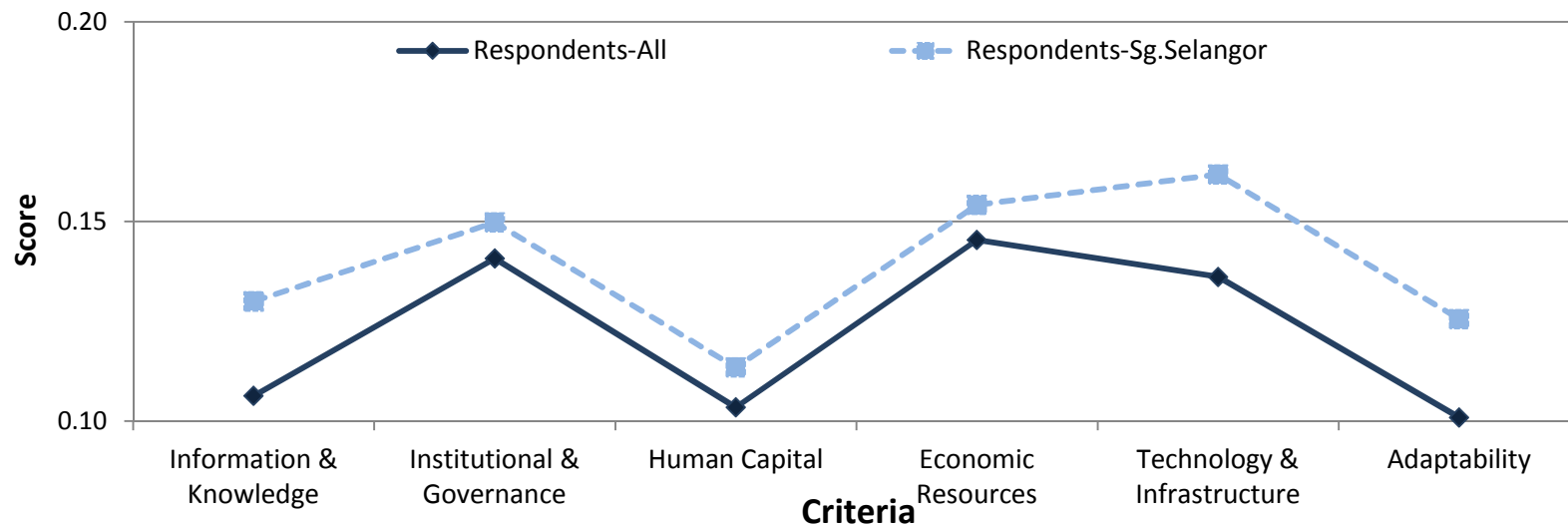


Scoring of Indicators



Level of Adaptive Capacity

Indicator	Adaptive Capacity Score	
	All respondents	Respondents with Experience on Sg. Selangor
Information & Knowledge	0.1064	0.1300
Institutional & Governance	0.1408	0.1498
Human Capital	0.1035	0.1135
Economic Resources	0.1454	0.1542
Technology & Infrastructure	0.1362	0.1618
Adaptability	0.1009	0.1256
TOTAL	0.7331	0.8349



Some Observations

Planning and decision making:

- Recognise the risks and need for adaptation to a changing climate.
- Integrate uncertainty in climate change into adaptation planning and decision making

Financial aspects:

- Allocation of financial resources for adaptation to climate change.
- Approach financial needs for adaptation in a strategic manner.

Technology & infrastructure:

- Integrate climate change risks assessment in planning new infrastructure
- Incorporate climate change adaptation elements in infrastructural development
- Consider management solutions along with technology fixes (e.g. data gathering, monitoring, early warning system, etc).

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THANK YOU!!!

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