A NEW CONSIDERATION IN WATER RELATED INFRASTRUCTURE PLANNING & DESIGN

SYNOPSIS

This project proposal will be emphasizing on approach (s) and tool (s) in adapting climatic (change and variability) and non-climatic impacts in water related infrastructure for design and planning which can be utilised and implemented for floods protection and water supply projects. A new paradigm shift is required in the methods that are used for justifying new water resources investments and projects

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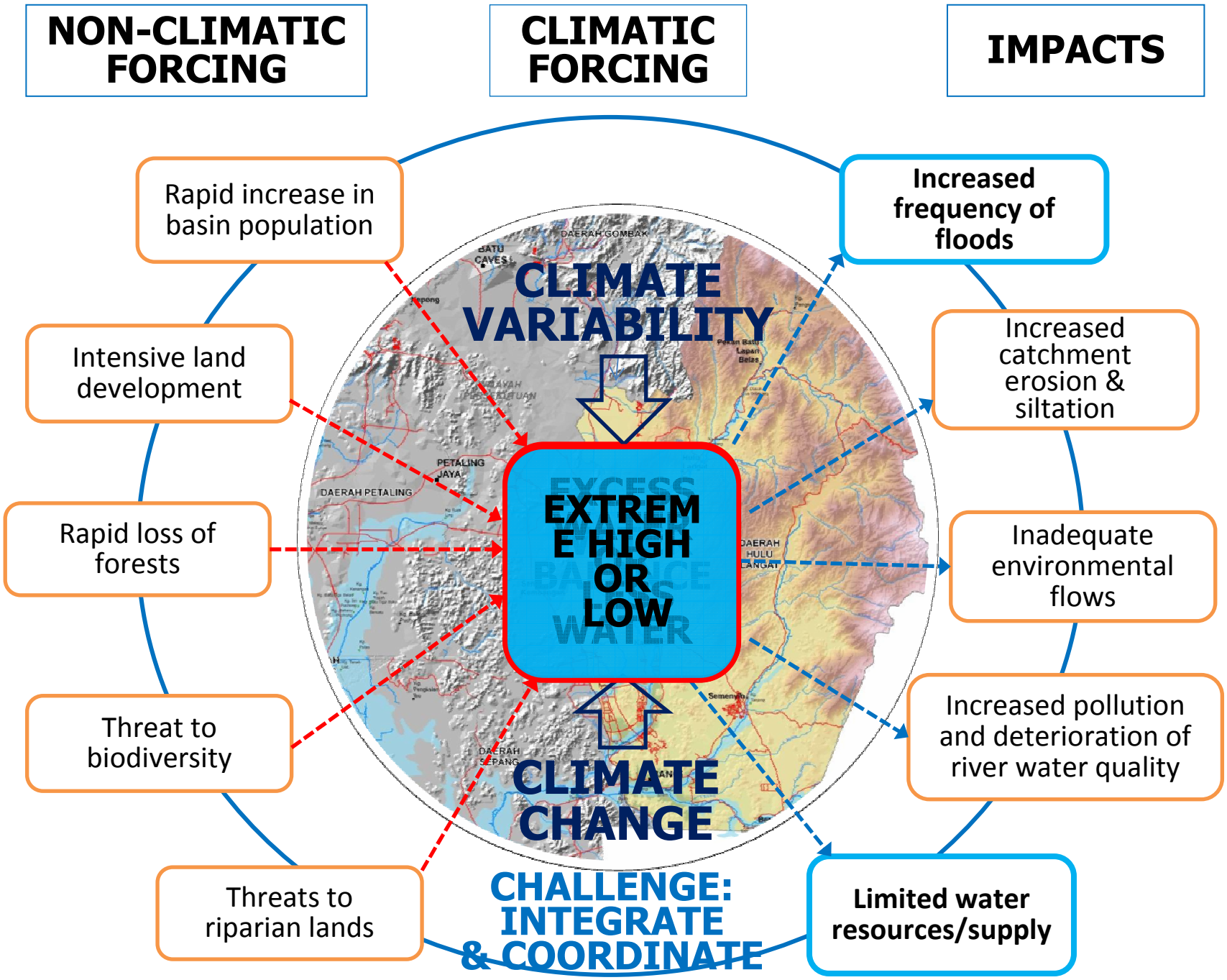

NON-CLIMATIC FORCING
CLIMATIC FORCING
IMPACTS
Rapid increase in basin population
Intensive land development
Rapid loss of forests
Threat to biodiversity
Threats to riparian lands
CLIMATE VARIABILITY
EXTREME HIGH OR LOW
CLIMATE CHANGE
Increased frequency of floods
Increased catchment erosion & siltation
Inadequate environmental flows
Increased pollution and deterioration of river water quality
Limited water resources/supply
CHALLENGE: INTEGRATE & COORDINATE

WATER RESOURCES MANAGEMENT (RISK) & WATER SERVICES

evolved of adaptive management (core principle)

1. adapting to the risk and uncertainty of **climate variability - extreme**
2. **reduce vulnerability, enhance system resiliency and robustness**
3. **NO REGRET APPROACH**

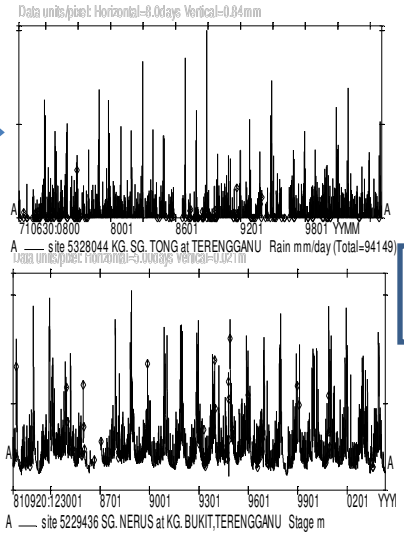
1. based on analyses of **past records of climatic and hydrology** parameters [i.e. 100 years ARI]
2. Different combinations of tools [i.e. technology innovation, engineering design change, multi-objective watershed planning, regulatory etc.]
3. evaluating management & operational options – under climate variability scenario

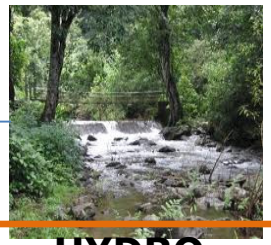
CLIMATE CHANGE

Issue: additional (multiple) impacts & uncertainties, and how to adapt more effectively

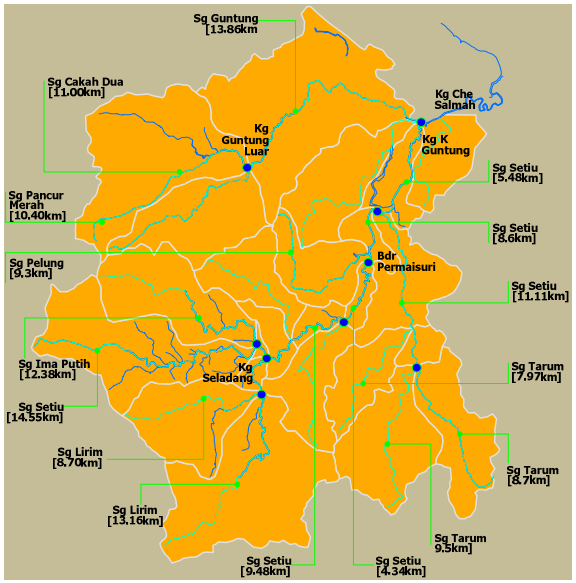
HYDROLOGIC & HYDRAULIC DESIGN

To estimate **water surface profile, platform level, size of hydraulic structure** corresponding to any return period of occurrence or level of protection **AVERAGE RECURRENCE INTERVAL (RETURN PERIOD)**





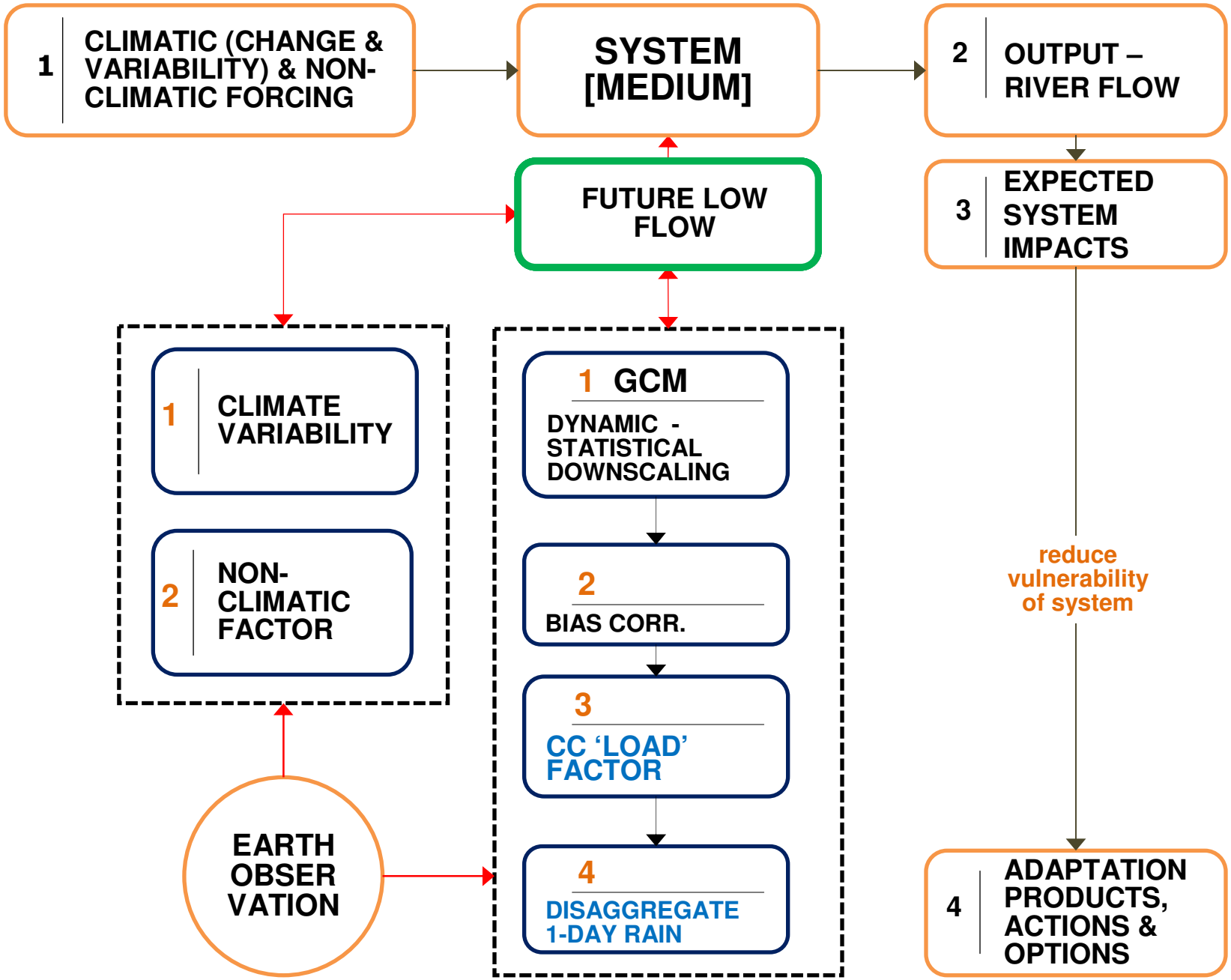
HYDRO-METEOROLOGY DATA



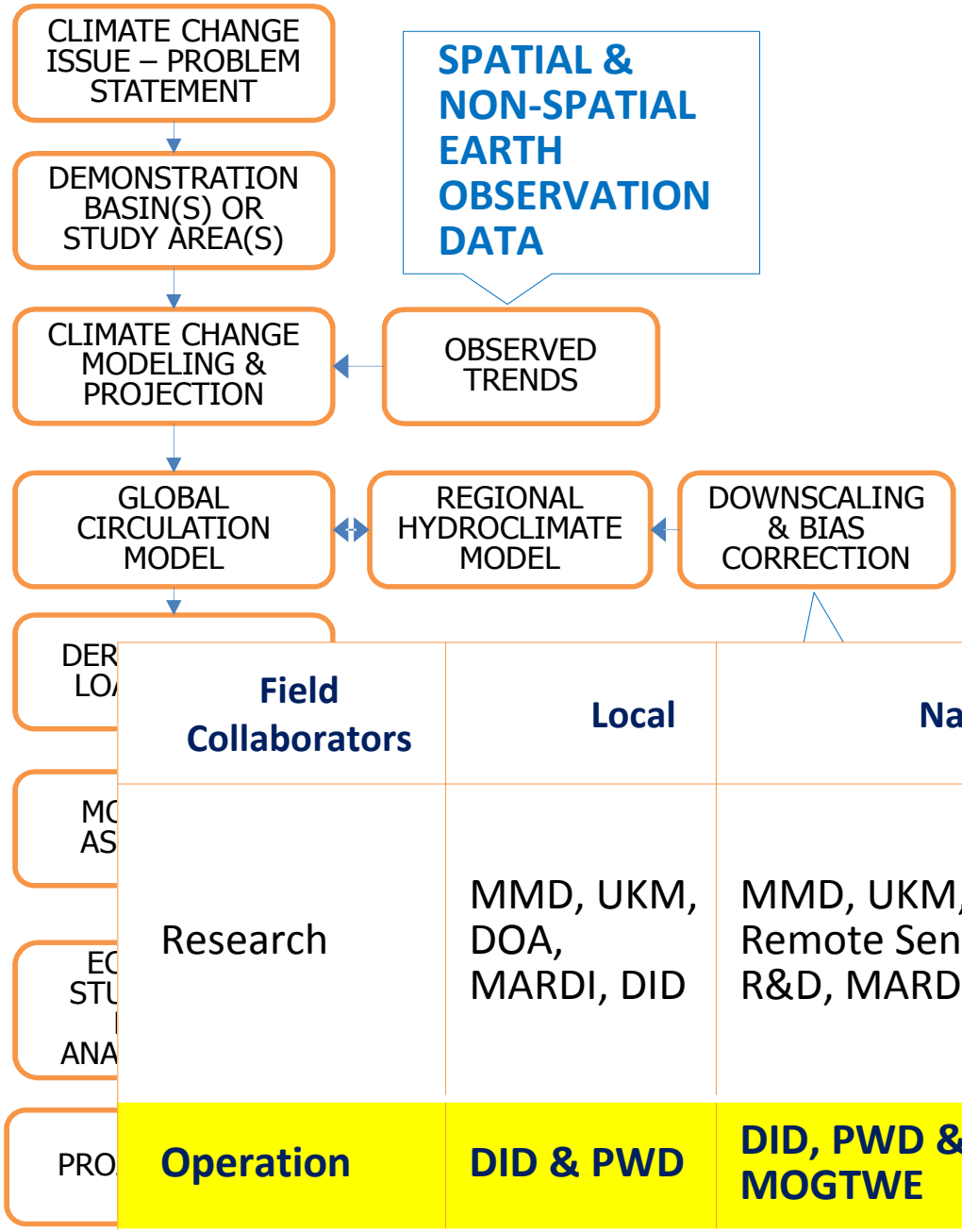
HYDROLOGY MODELING → **HYDRAULIC MODELING**

WATERSHED – "MEDIUM - SYSTEM"

HYDRAULIC STRUCTURES


1 CLIMATIC (CHANGE & VARIABILITY) & NON-CLIMATIC FORCING
SYSTEM [MEDIUM]
2 OUTPUT – RIVER FLOW
FUTURE LOW FLOW
3 EXPECTED SYSTEM IMPACTS
1 CLIMATE VARIABILITY
2 NON-CLIMATIC FACTOR
1 GCM
DYNAMIC - STATISTICAL DOWNSCALING
2 BIAS CORR.
3 CC 'LOAD' FACTOR
4 DISAGGREGATE 1-DAY RAIN
EARTH OBSER VATION
reduce vulnerability of system
4 ADAPTATION PRODUCTS, ACTIONS & OPTIONS

PROPOSED METHODOLOGY AND TECHNICAL PLAN



TECHNICAL GUIDELINES

CLIMATE CHANGE LOAD FACTOR

RAINFALL LOAD FACTOR

DRAINAGE SYSTEM, WATER RELATED INFRASTRUCTURE (ROAD & HIGHWAY) etc.

TEMP. LOAD FACTOR

ROAD & HIGHWAY STANDARD

Field Collaborators	Local	National	Regional
Research	MMD, UKM, DOA, MARDI, DID	MMD, UKM, Agency Remote Sensing, TNB R&D, MARDI, DID	Univ. of Tokyo, Institute Water Management (IWM), JICA, RHIMES, Regional Water Knowledge Hubs
Operation	**DID & PWD**	**DID, PWD & MOGTWE**	-