Putting Distillation Into Practice: Co-developing Climate Services In South Asia

ICRC-CORDEX 2019: International Conference on Regional Climate,

Benjamin Harrison

Met Office Hadley Centre

17 October 2019 Beijing, China

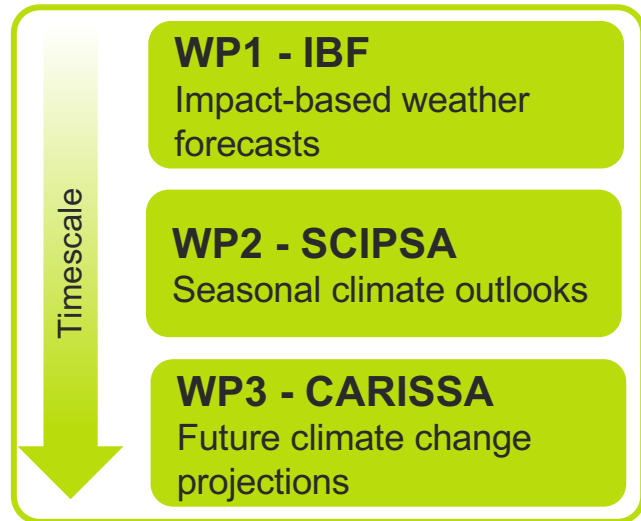Why do we use regional climate model data for other regions?

Asia Regional Resilience to a Changing Climate (ARRCC)

Met Office

Timescale

WP1 - IBF
Impact-based weather forecasts

WP2 - SCIPSA
Seasonal climate outlooks

WP3 - CARISSA
Future climate change projections

WP4 - VALUE
Strengthening knowledge on gaps & socio-economic value of services

SCIE

Regional Workshop on Future Climate Projections and Their Applications in South Asia
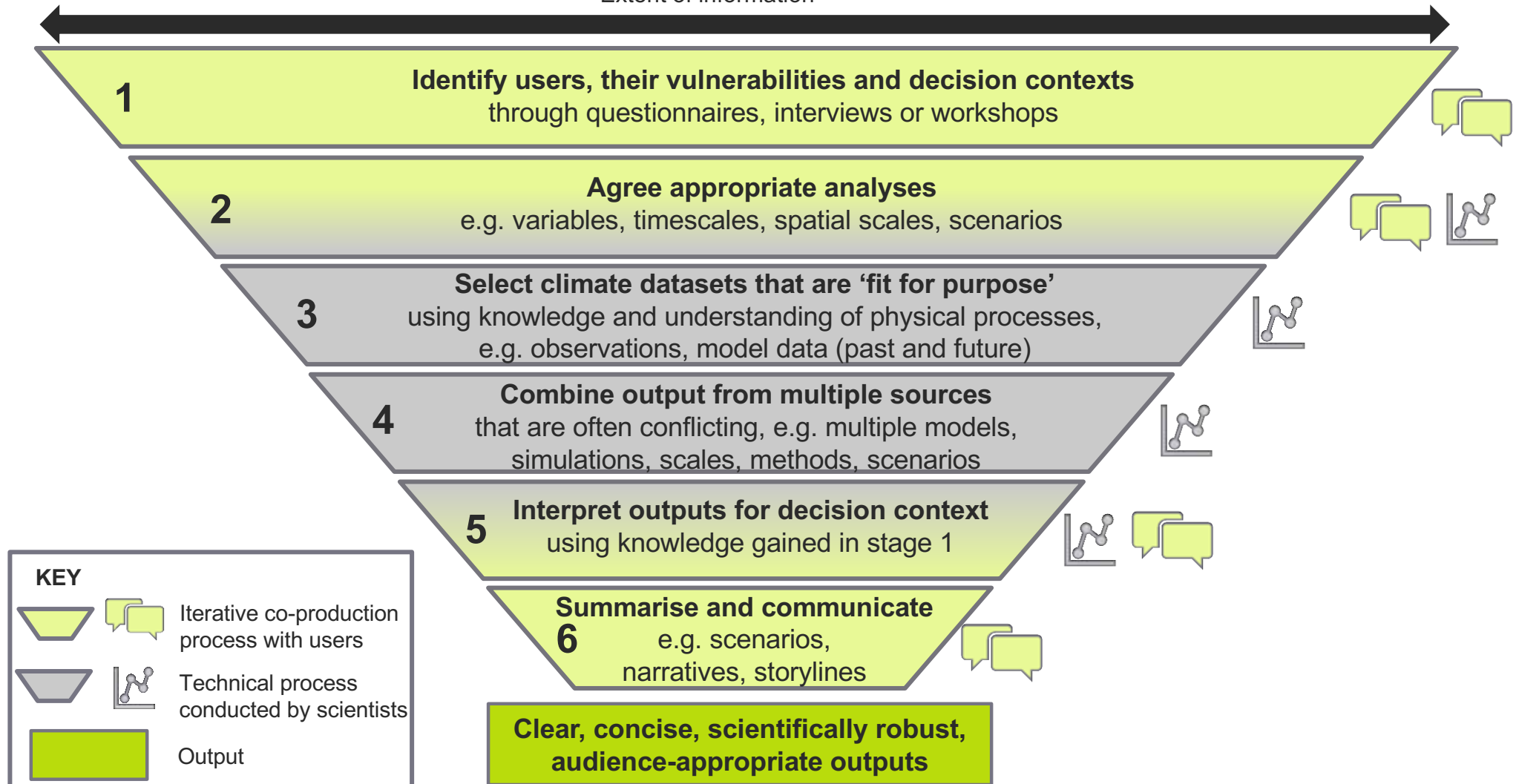
31 January 2019, Kathmandu, Nepal

Why do we need climate information distillation?
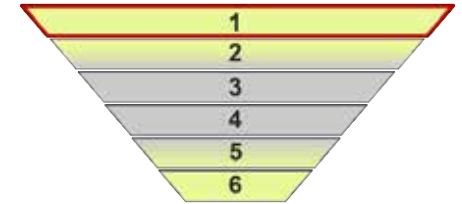
Met Office

How do we make sense of all this information?

How can we make the best use of this information to inform decision makers?

The Climate Information Distillation Funnel

Extent of information

1 **Identify users, their vulnerabilities and decision contexts**
through questionnaires, interviews or workshops

2 **Agree appropriate analyses**
e.g. variables, timescales, spatial scales, scenarios

3 **Select climate datasets that are 'fit for purpose'**
using knowledge and understanding of physical processes,
e.g. observations, model data (past and future)

4 **Combine output from multiple sources**
that are often conflicting, e.g. multiple models,
simulations, scales, methods, scenarios

5 **Interpret outputs for decision context**
using knowledge gained in stage 1

6 **Summarise and communicate**
e.g. scenarios,
narratives, storylines

**Clear, concise, scientifically robust,
audience-appropriate outputs**

KEY

Iterative co-production
process with users

Technical process
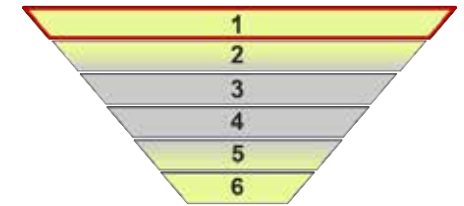conducted by scientists

Output

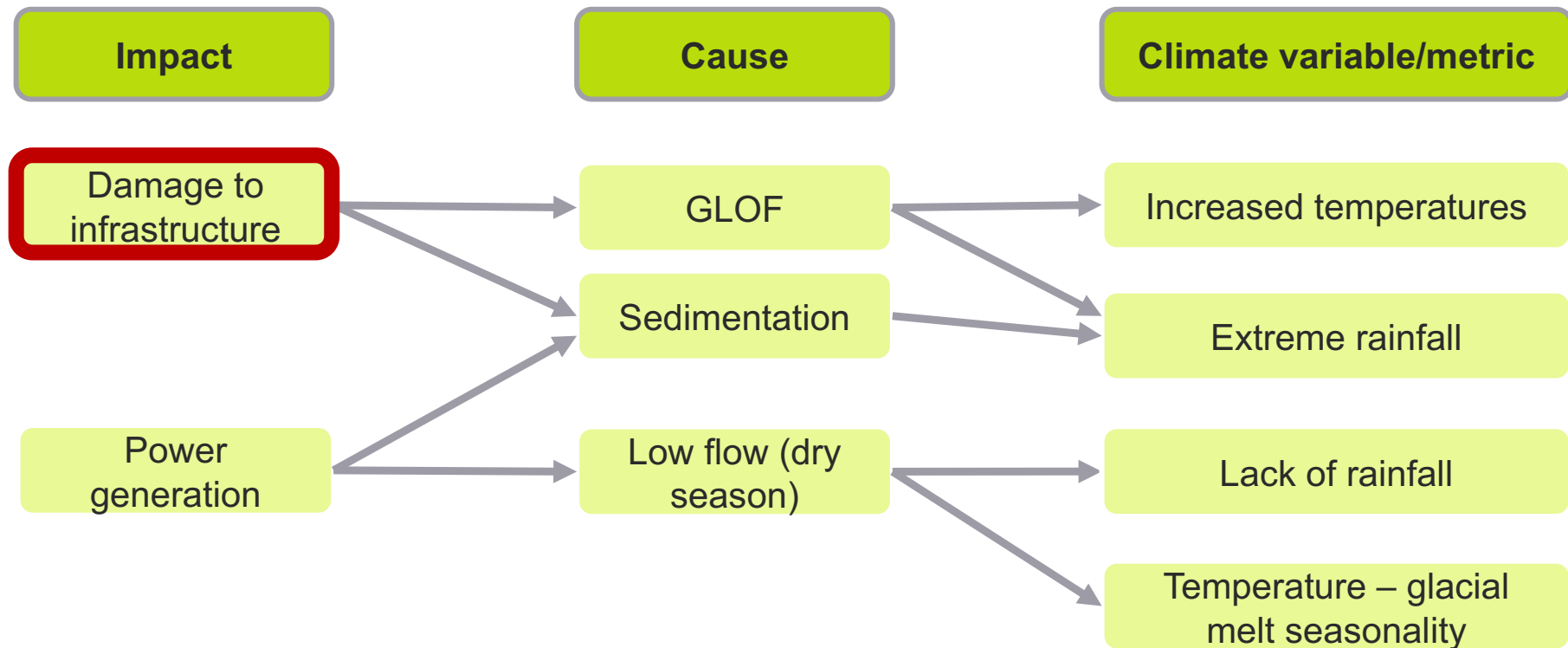# 1: Identify users, their vulnerabilities and decision contexts

What:

- Who are the users? *E.g. businesses, government organisations, regulators, scientists*

- What hazards are they exposed to? *E.g. flooding, drought, heatwaves, tropical cyclones*

- What are their vulnerabilities? *E.g. damage to infrastructure, loss of life, financial risk, energy generation*

- What decisions are they making? *E.g. long-term investments, adapting existing processes/infrastructure*

- How is climate information currently used in planning/adapting? *E.g. current, future, what data/metrics?*

How:

- Collaborative process with users

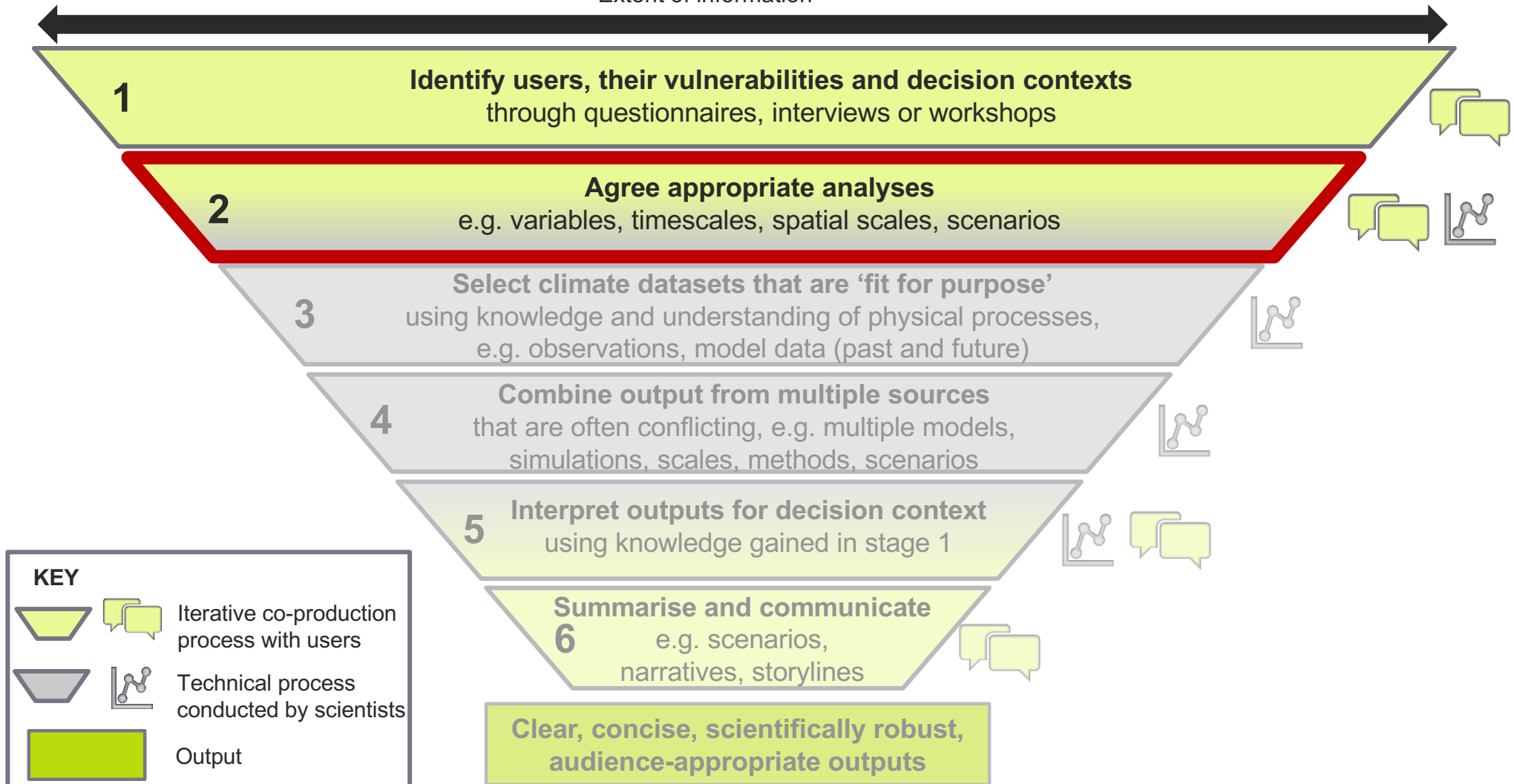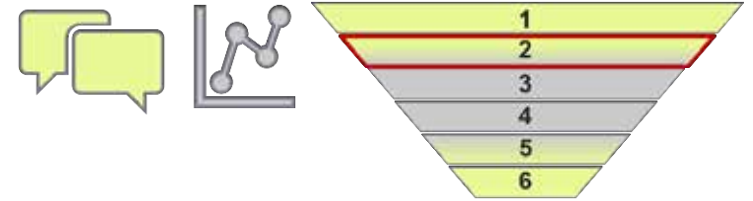- E.g. questionnaire, interviews or workshops to engage with users

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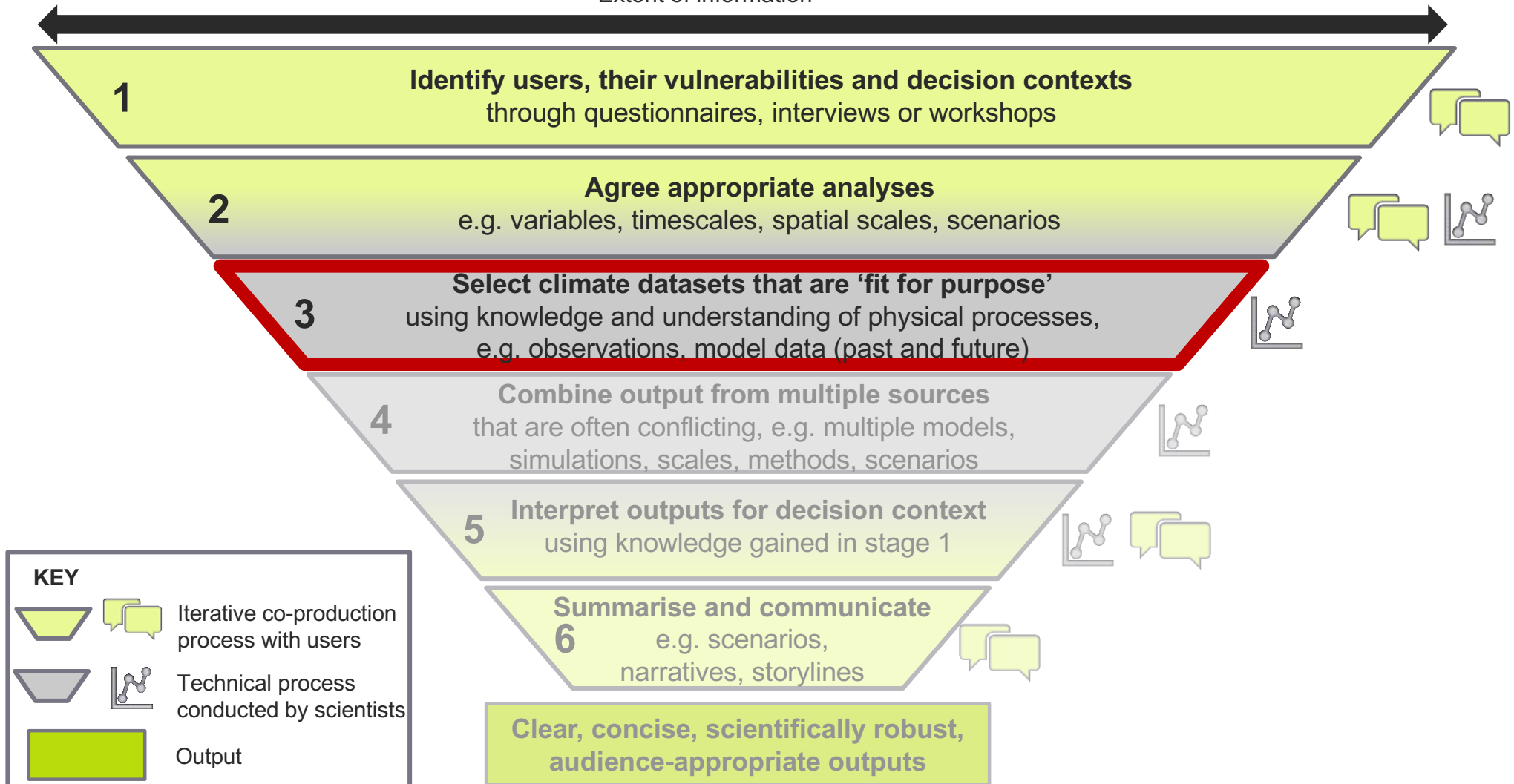
2: Agree appropriate analysis

What:

- Variables: *precipitation, temperature, winds,*

- Timescales: *historical, baseline, future projections, which future time periods are most appropriate?*

- Spatial scale: *focus region for science question, domain for climate analysis*

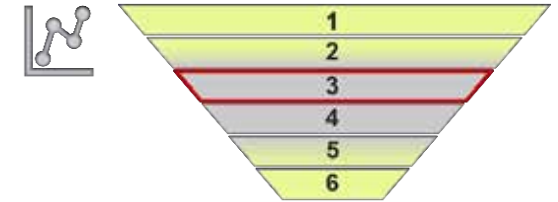- Scenarios: *RCPs (RCP2.6, 4.5, 6.0, 8.5), SRES (A1B, A2…)*

How:

- In collaboration with users

- Draw on user requirements and scientific understanding of what's available/plausible

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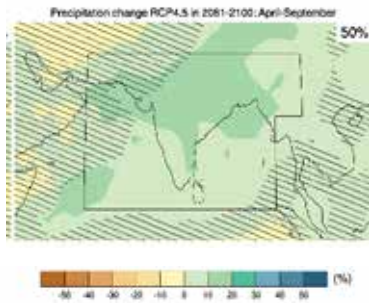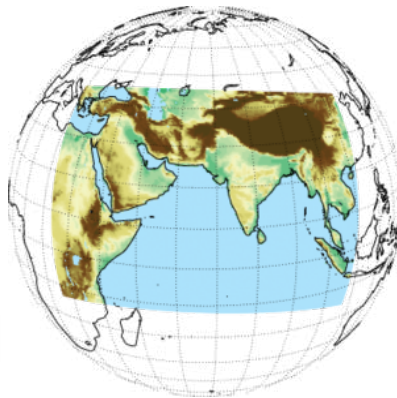
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3: Select climate datasets that are 'fit for purpose'

Model data
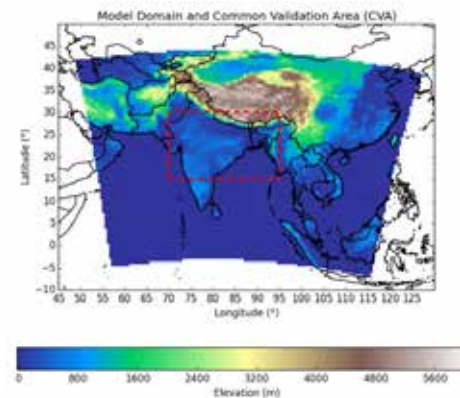
GLOBAL	REGIONAL (dynamical)	REGIONAL (dynamical)	REGIONAL (statistical
CMIP5	CORDEX	DECCMA	Nepal climate scenarios (NAP)
~40 models	17 models	3 models	4 models

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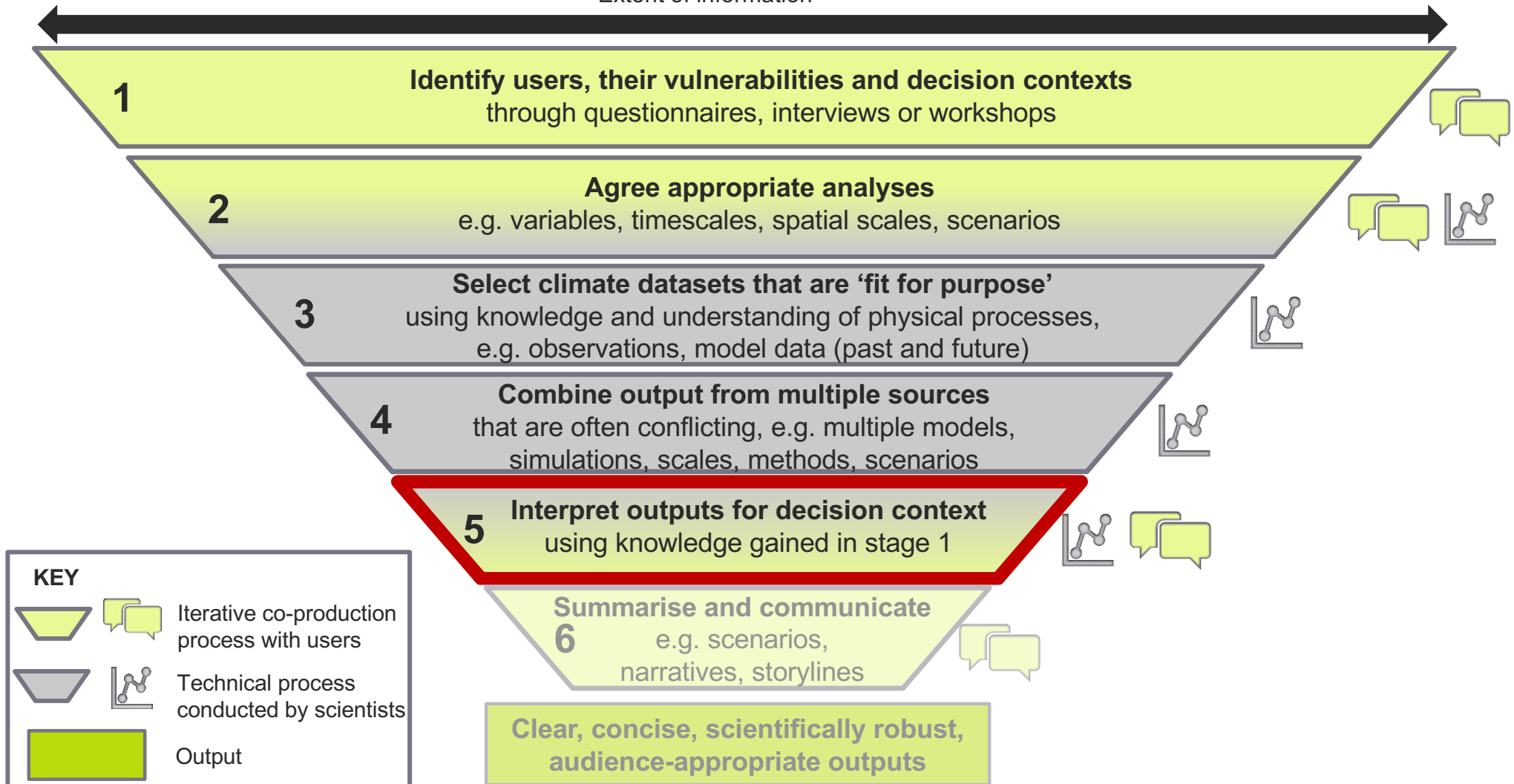
4: Combine output from multiple sources

- **Multiple models:**
  - Model democracy or model weighting?
  - Sub-selection of model ensemble?

- **Multiple simulations:**
  - Initial condition ensembles, perturbed physics ensembles?

- **Multiple scales:**
  - Global / regional projections, how do they compare?

- **Multiple methods:**
  - Downscaling: dynamical vs statistical
  - Caution with results from different methods

- **Multiple scenarios:**
  - RCPs (RCP2.6, 4.5, 6.0, 8.5), SRES (A1B, A2…)
  - Put contrasting scenarios in context with one another
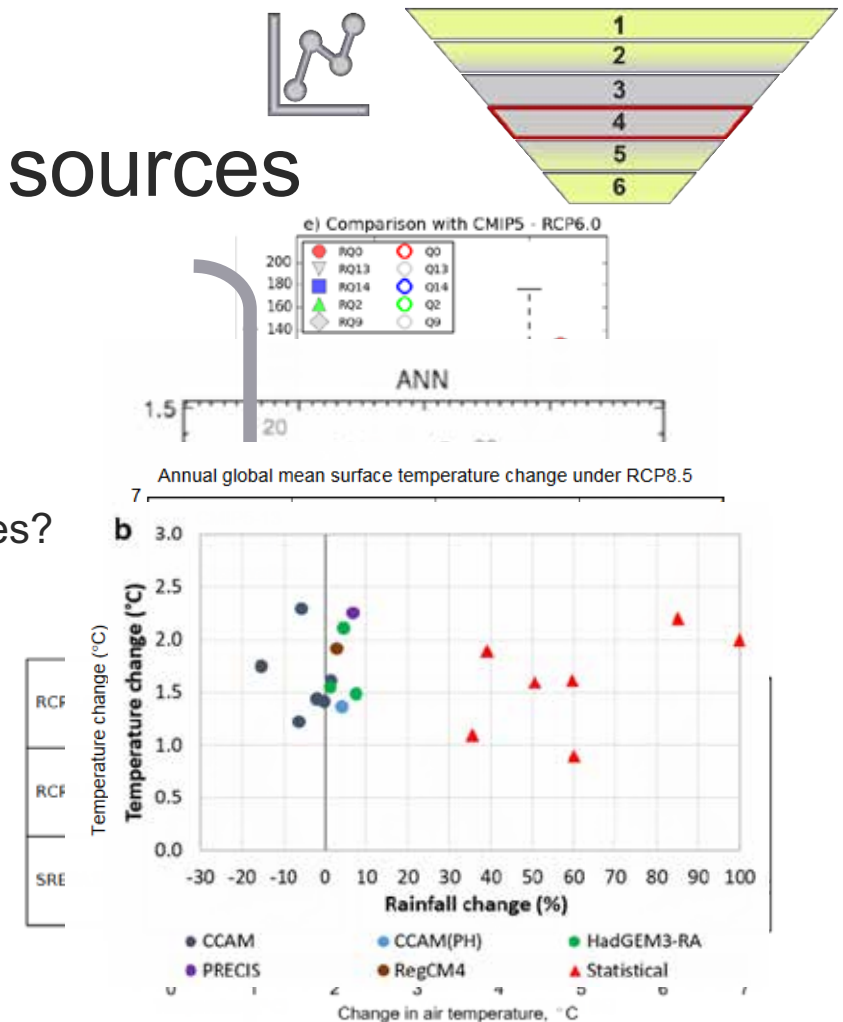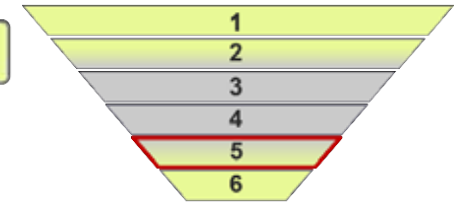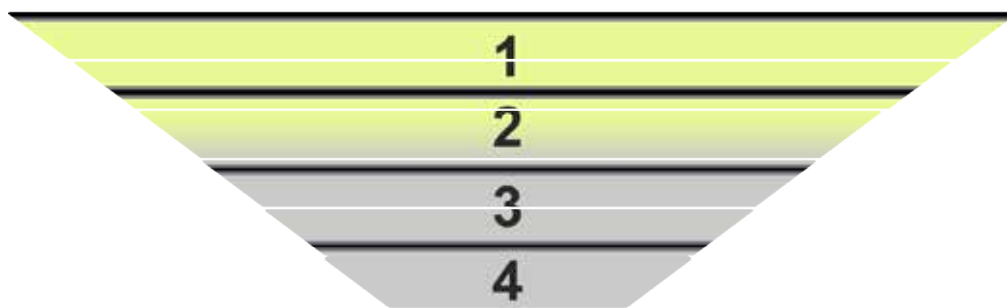
Source: Janes et al 2015; UKCP18 Science report

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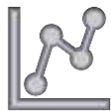conducted by scientists

Output

5: Interpret outputs for decision context

Interpret outputs from previous stages to generate useful advice for decision-making

Requires climate scientists to use their expertise and knowledge of the climate system and climate modelling.

Draws on the information gained in stage 1 around the users' vulnerabilities and interests, as well as ongoing engagement with the users, to ensure the interpretation of the climate projections produces information that is useful to the decision context.

Example: Pilot information product: Sea level Change

How can multi-decadal sea level projections be used within coastal climate services for the region?
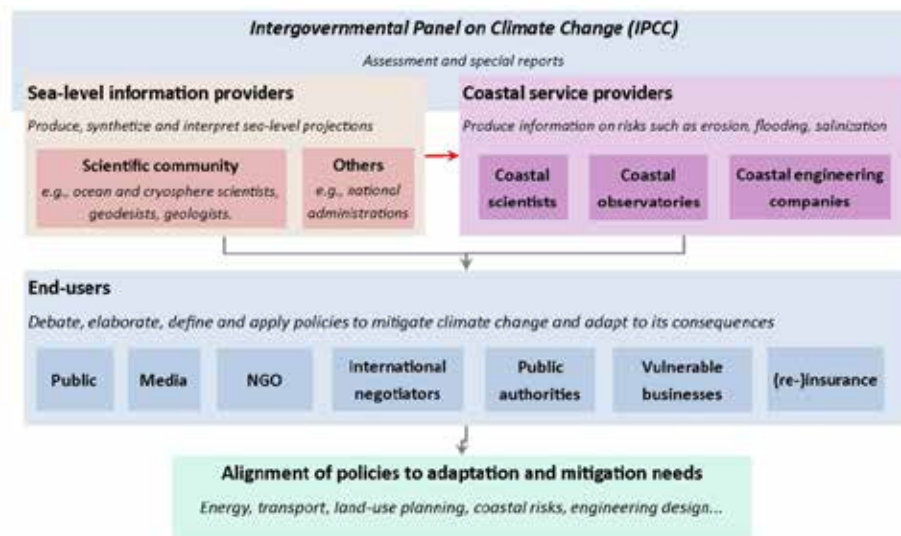

Fig 1a. Current interactions between users and providers of sea level projections. Arrow denote information flows involving sea level information

Le Cozannet et al: Sea Level Change and Coastal Climate Services: The Way Forward. Journal of Marine Science and Engineering - https://doi.org/10.3390/jmse5040049
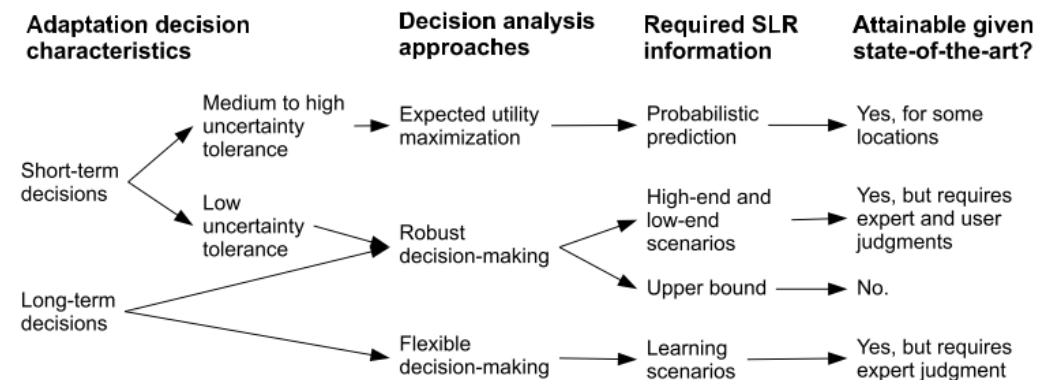
Fig 1b. Decision analysis approaches and sea level information needs, depending on user decision horizon and their uncertainty tolerance.

Hinkel, J. et al: Meeting User Needs for Sea Level Rise Information: A Decision Analysis Perspective. Earth's Future- https://doi.org/10.1029/2018EF001071

6: Summarise and communicate

What:

- Scenarios, narratives, storylines

- Range of plausible projections and potential impacts

How:

- Co-produced with users to ensure understanding and usability of final output

- Consider language of the user, both spoken and level of technical understanding, during co-development process and for the communication outputs themselves.

- Format driven by users' preferences and their technical capability to understand the outputs.

- Examples of outputs include simple text summaries, infographics or more technical visualisations.

Thank you

Any questions?

ARRCC WP3-CARISSA
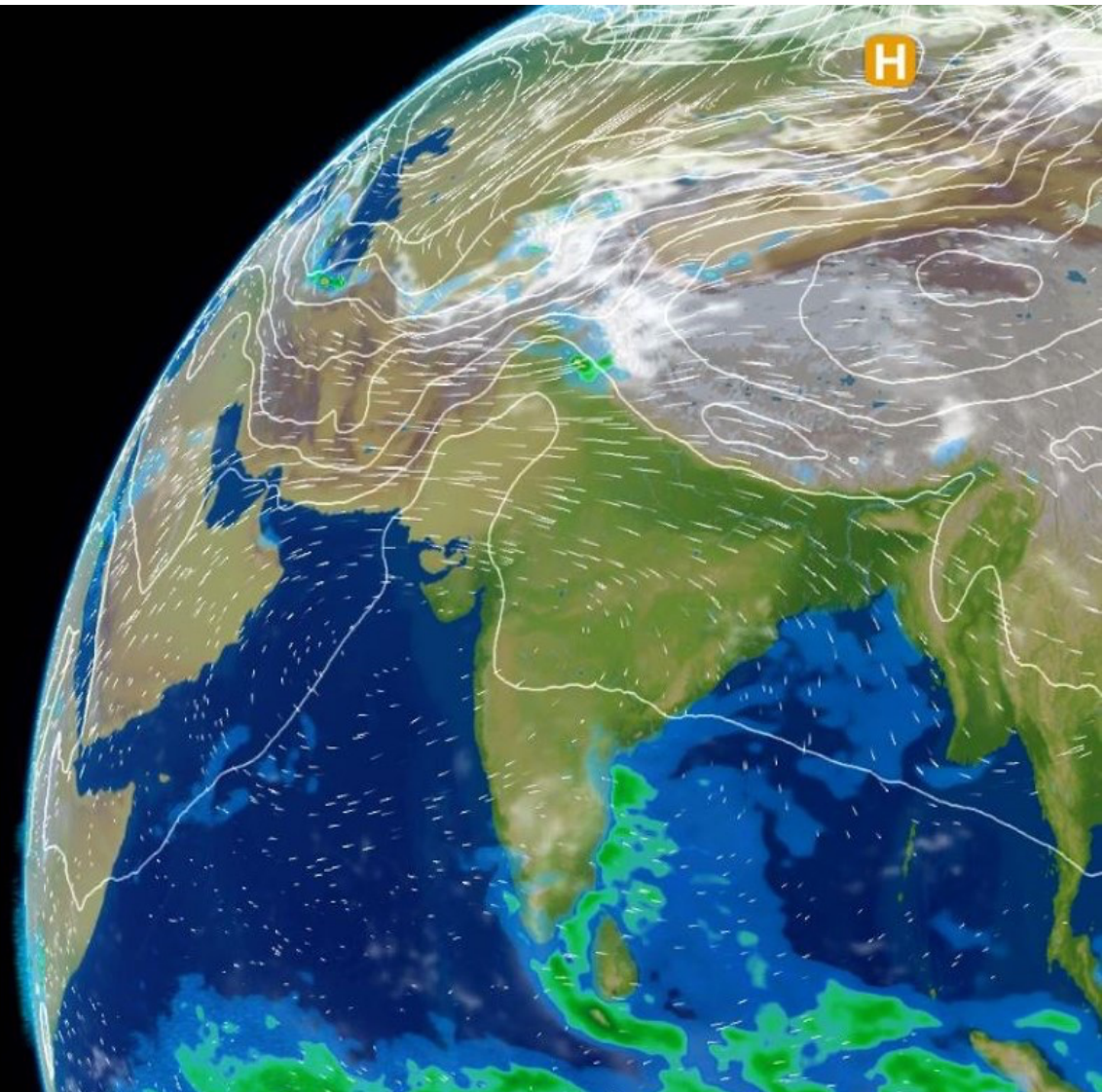
Climate Analysis for Risk Information and Services in South Asia

Planned activities September 2019-2022 :

Training and Capacity Development

Activity 1: Training and capacity development

Regional forums and data platforms

Activity 2: Development of regional forum on climate change

Activity 3: Enhancing regional climate projection data platforms

Sector and risk-specific activities

Activity 4: Climate change information services for the water and hydropower sector

Activity 5: Information for managing coastal climate risks

Activity 6: Climate services for food security