

New scenario development ahead of the IPCC AR5

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Why are new scenarios needed?

- IPCC and other organizations require coordinated global-scale scenarios for future assessments (e.g. AR5)
- SRES did not consider explicit climate policies – these are needed
- Climate models are becoming “Earth system” models
 - Greater demands on forcing scenarios (higher spatial resolution, more species, land use)
 - Opportunities for intercomparison and learning across communities
- Climate change connects to many other areas of policy (energy, agriculture, hazards, natural resources, economic development)
 - Create new scenarios for global scale analysis to support IPCC, UNFCCC, and others
 - Support development of consistent but independent scenarios to meet sectoral/regional needs by providing data and methods
 - Facilitate the comparison and aggregation of sectoral and national/regional research and assessment

Some scenario needs for IAV assessment

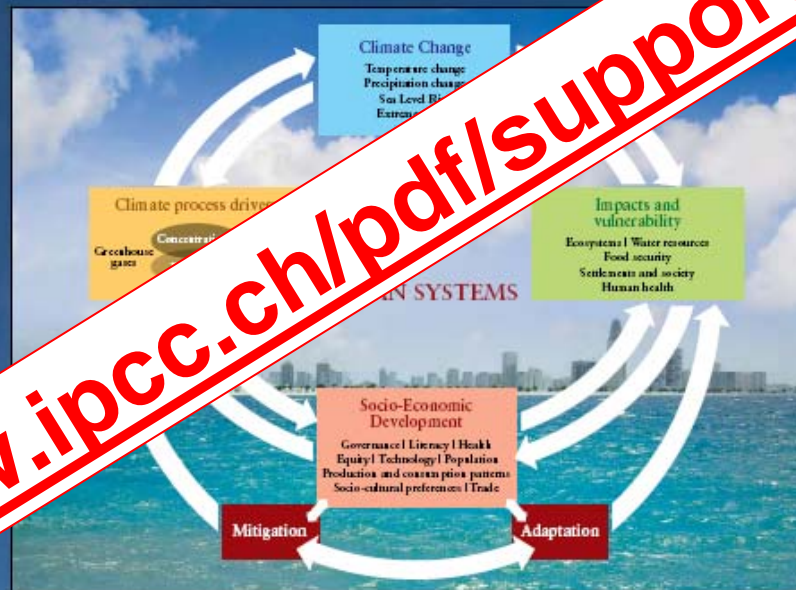
- Quantitative and mutually consistent projections of **key variables**
- **Spanning the range** of plausible projections of key variables
- Projections at the **spatial and temporal scales** of IAV analysis or amenable to downscaling/interpretation to those scales
- **Storylines** with sufficient regional detail to facilitate independent interpretation and scenario quantification at regional and local scale (e.g. for land use, technology)
- **Regional scenarios** for adaptation research that can be reconciled with recent trends and with planning and policy scenarios

TOWARDS NEW SCENARIOS FOR ANALYSIS OF EMISSIONS, CLIMATE CHANGE, IMPACTS, AND RESPONSE STRATEGIES

IPCC EXPERT MEETING REPORT

19–21 September, 2007

Noordwijkerhout, The Netherlands

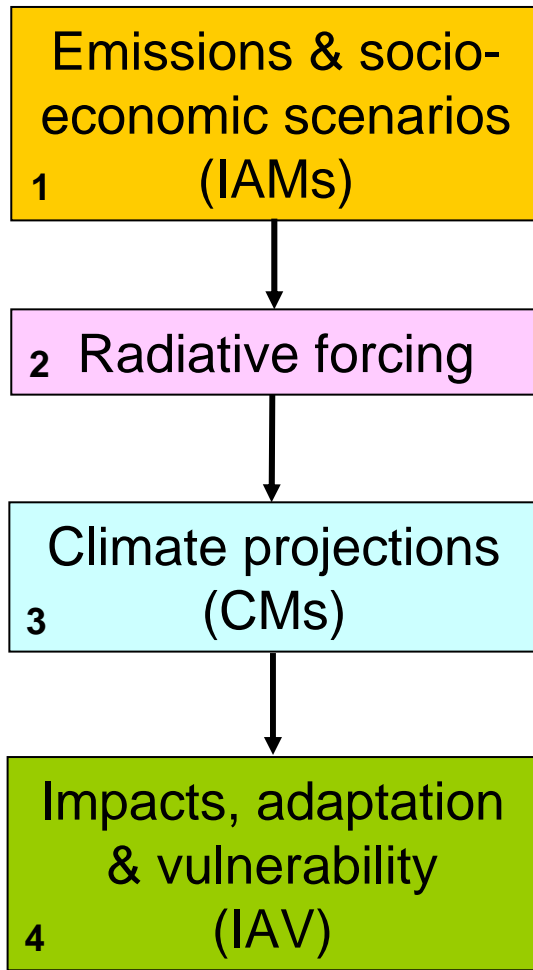


Intergovernmental Panel on Climate Change

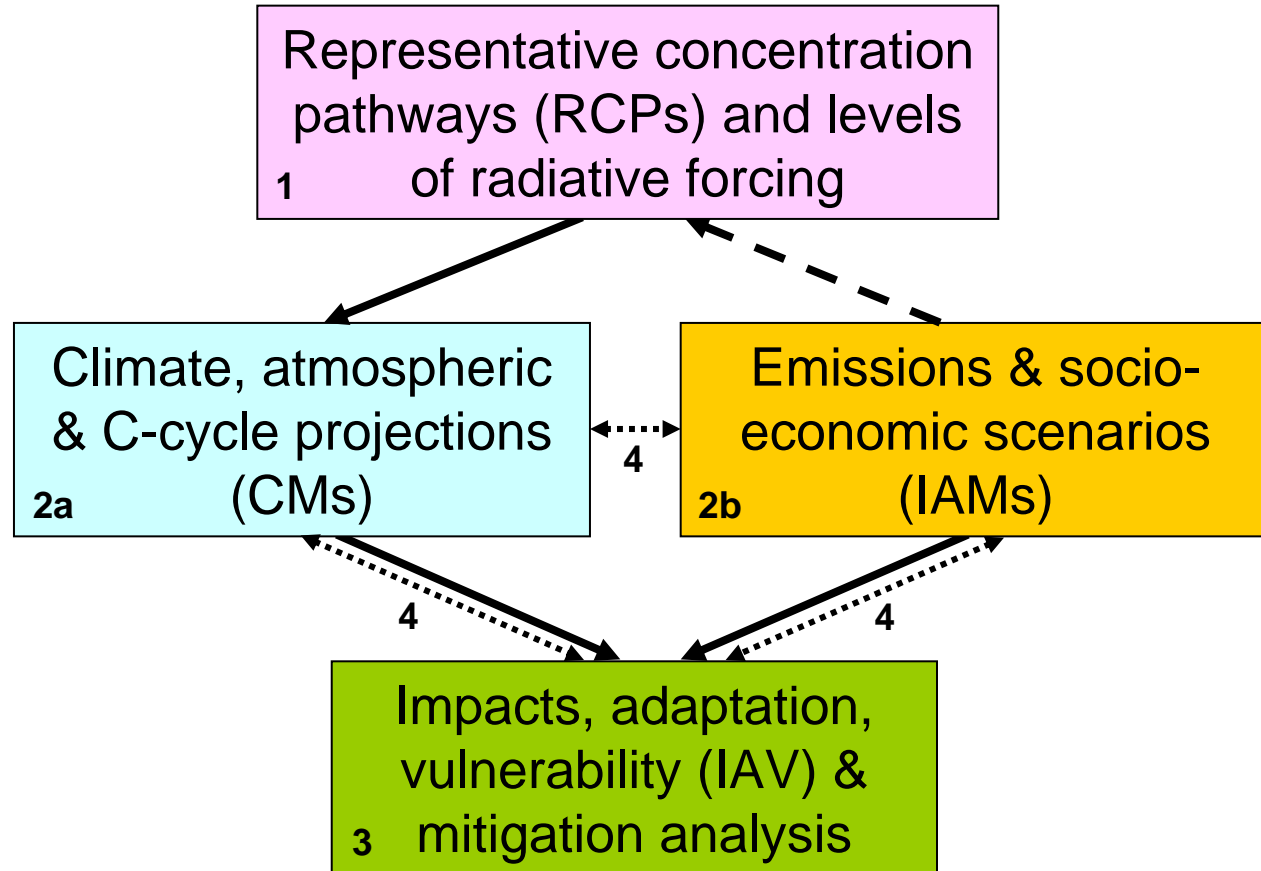


<http://www.ipcc.ch/pdf/supporting-material/>

(a) Sequential approach



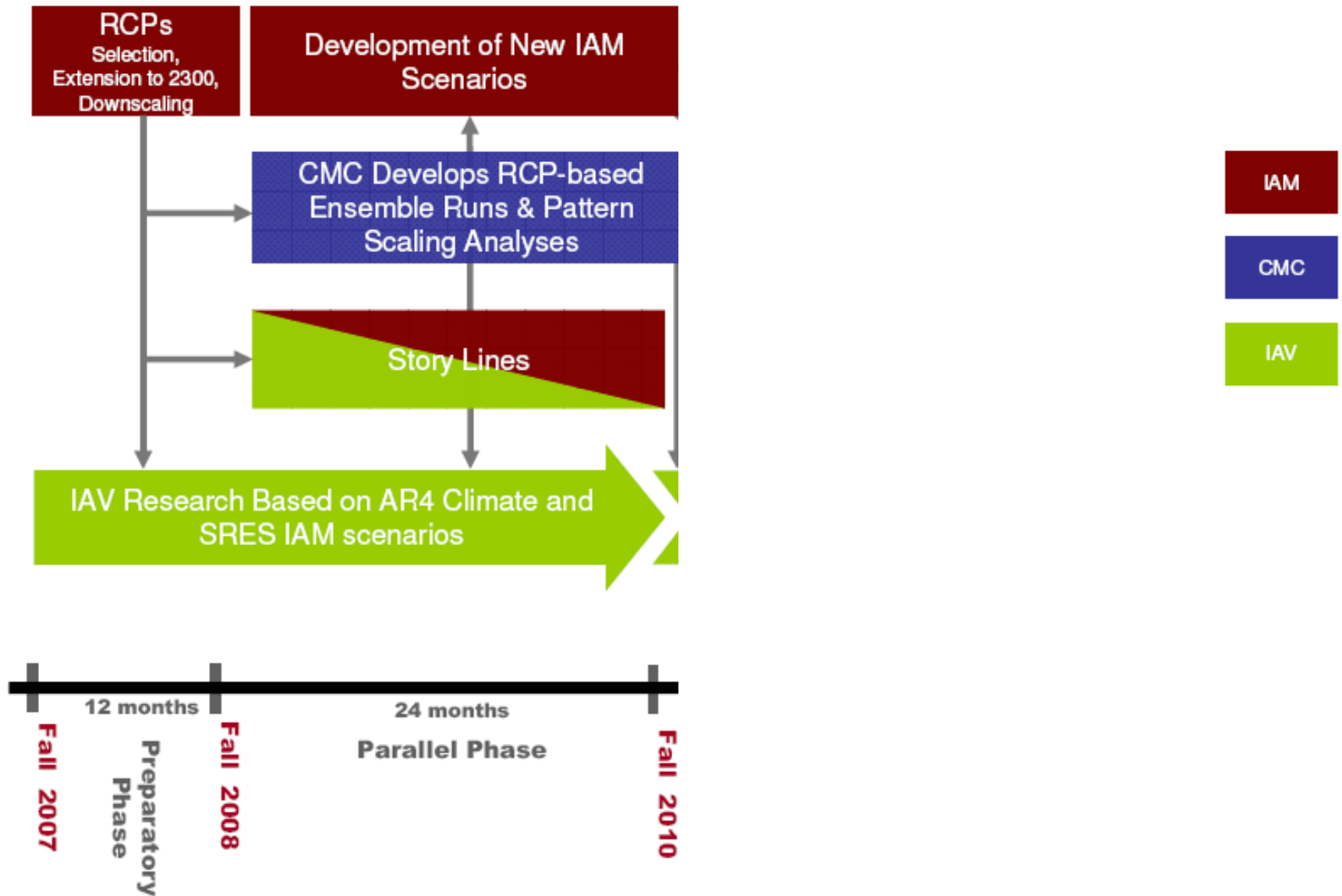
(b) Parallel approach



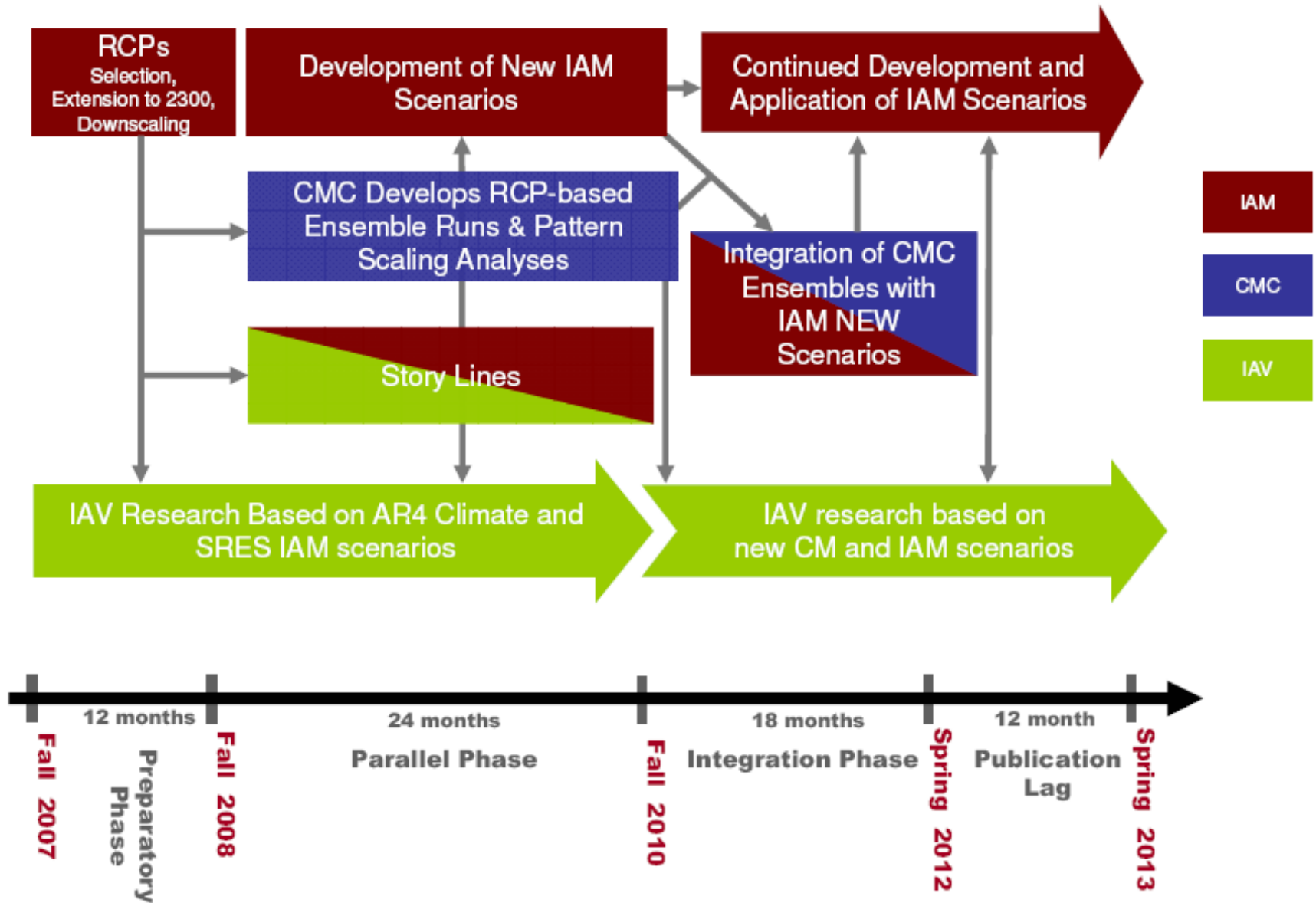
Time line and critical path of scenario development



Time line and critical path of scenario development



Time line and critical path of scenario development



Representative Concentration Pathways (RCPs): criteria for consideration

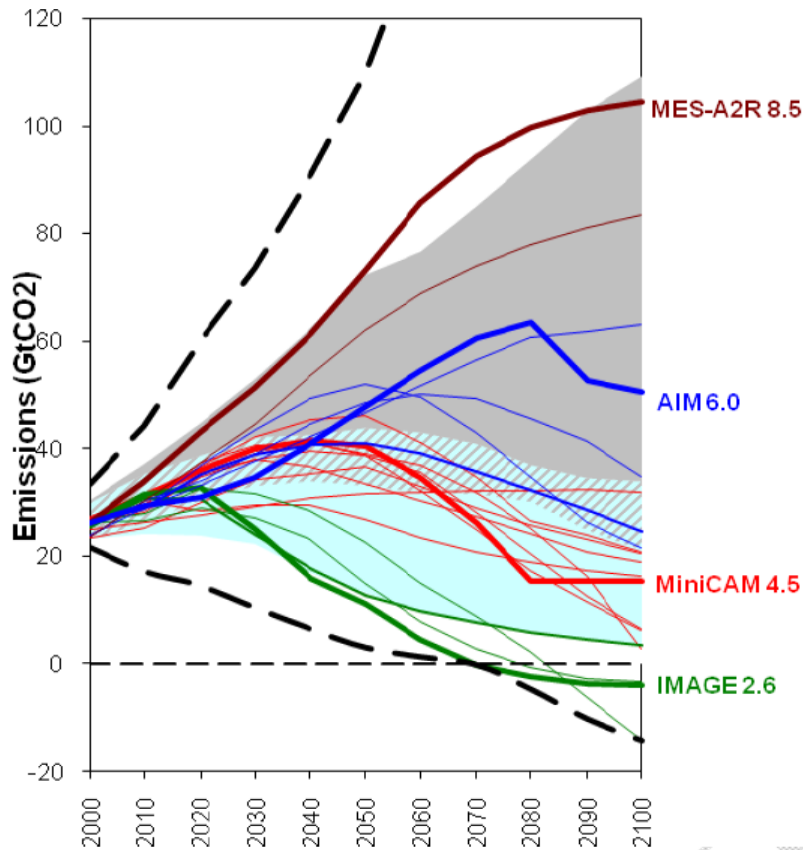
- Peer-reviewed and published
- Well separated and corresponding to one of four radiative forcing characteristics: BaU, stabilisation at two levels; peak and decline
- Providing required data to 2100 on GHGs, aerosols, chemically-active gases, land use and land cover; capable of finer resolution and extension to 2300
- Modelled with C-cycle and atmospheric chemistry
- Timely delivery

The four Representative Concentration Pathways (RCPs)

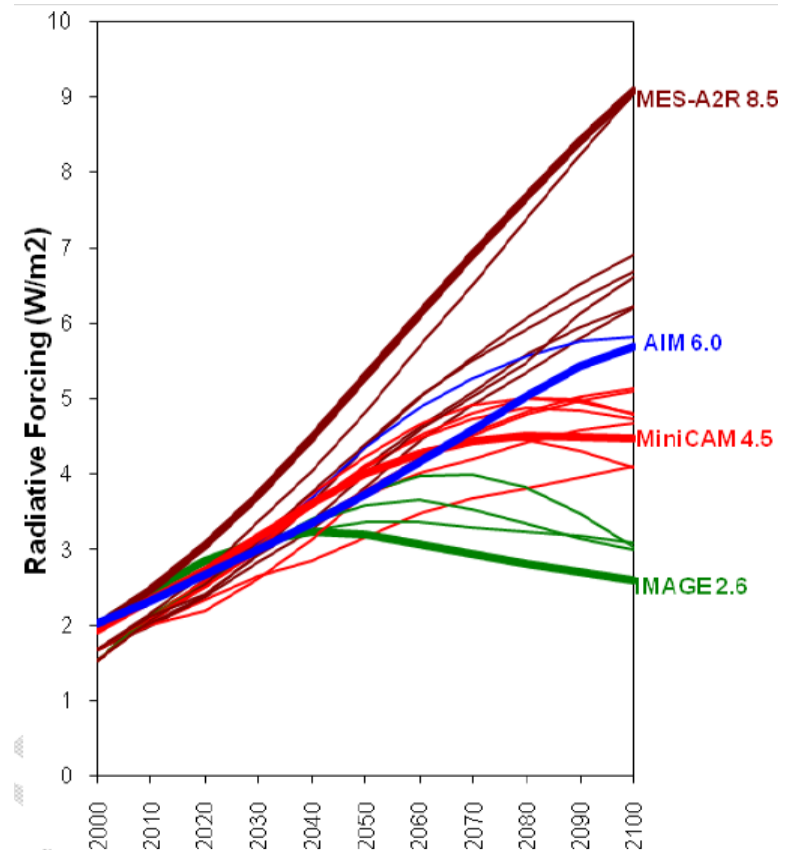
Name	Radiative forcing	Concentration	Pathway	Model providing RCP	Reference
RCP8.5	>8.5 W/m ² in 2100	>1370 CO ₂ -eq in 2100	Rising	MESSAGE	Rao & Riahi (2006), Riahi et al. (2007)
RCP6.0	~6 W/m ² at stabilisation after 2100	~850 CO ₂ -eq (at stabilisation after 2100)	Stabilisation without overshoot	AIM	Fujino et al. (2006), Hijioka et al. (2008)
RCP4.5	~4.5 W/m ² at stabilisation after 2100	~650 CO ₂ -eq (at stabilisation after 2100)	Stabilisation without overshoot	MiniCAM	Smith & Wigley (2006), Clarke et al. (2007)
RCP3.0	Peak at ~3 W/m ² before 2100 and then decline	Peak at ~490 CO ₂ -eq before 2100 and then decline	Peak and decline	IMAGE	van Vuuren et al. (2006, 2007)

Some features of the Representative Concentration Pathways (RCPs)

CO₂ Emissions



Radiative forcing



Two time scales for analysis

■ Long-term (2100, extended to 2300) to:

- Explore options for stabilization of human influences on climate (socio-economic, technology, and policy options) and consequences of failure
- Assess feedbacks (e.g., carbon cycle), “thresholds,” and discontinuities

■ Near-term (2035) to:

- Improve projections of regional climate change (extremes, air quality, decadal predictions)
- Explore near-term opportunities/constraints on adaptation and mitigation at national/regional scale (given current conditions, trends, and policies)

Co-ordination of research

Climate Modelling Community:

WCRP's Working Group on Coupled Models (WGCM);
IGBP's Analysis, Integration and Modeling of the Earth
System (AIMES)

Integrated Assessment Modelling Community:

Consortium formed

Impacts, Adaptation and Vulnerability Community:

No co-ordinating body yet

Scenarios for IAV research: some issues

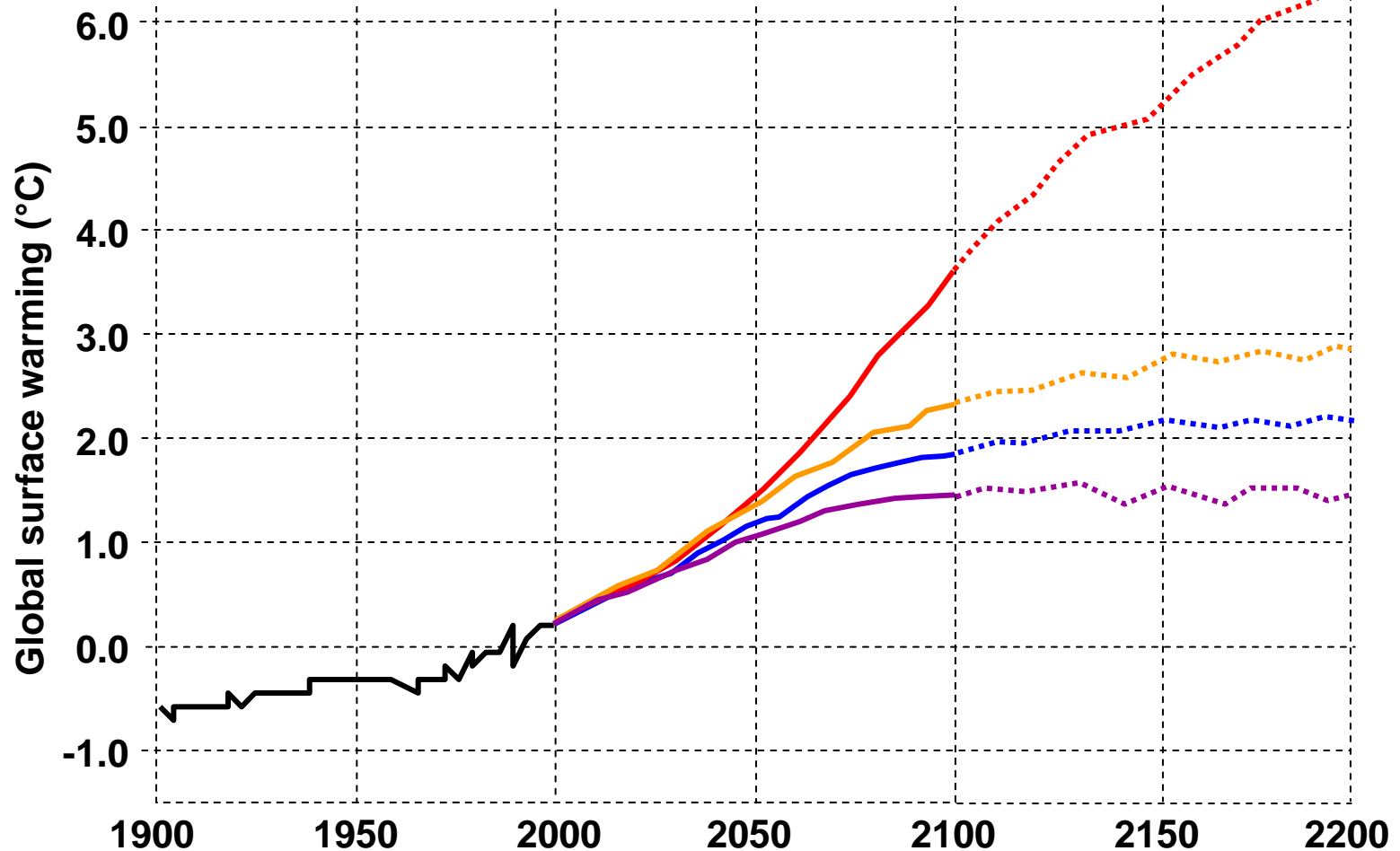
- How can researchers make use of the new RCP-based climate projections in conjunction with new socio-economic and technological scenarios?
- At what temporal and spatial resolutions will new scenarios be made available and how far into the future will the scenarios extend?
- What guidance can be offered for selecting from the large number of projections being produced?
- Will the scenarios be associated with storylines similar to those constructed for SRES?
- What is the time schedule for delivery of new scenarios and how can they be accessed?

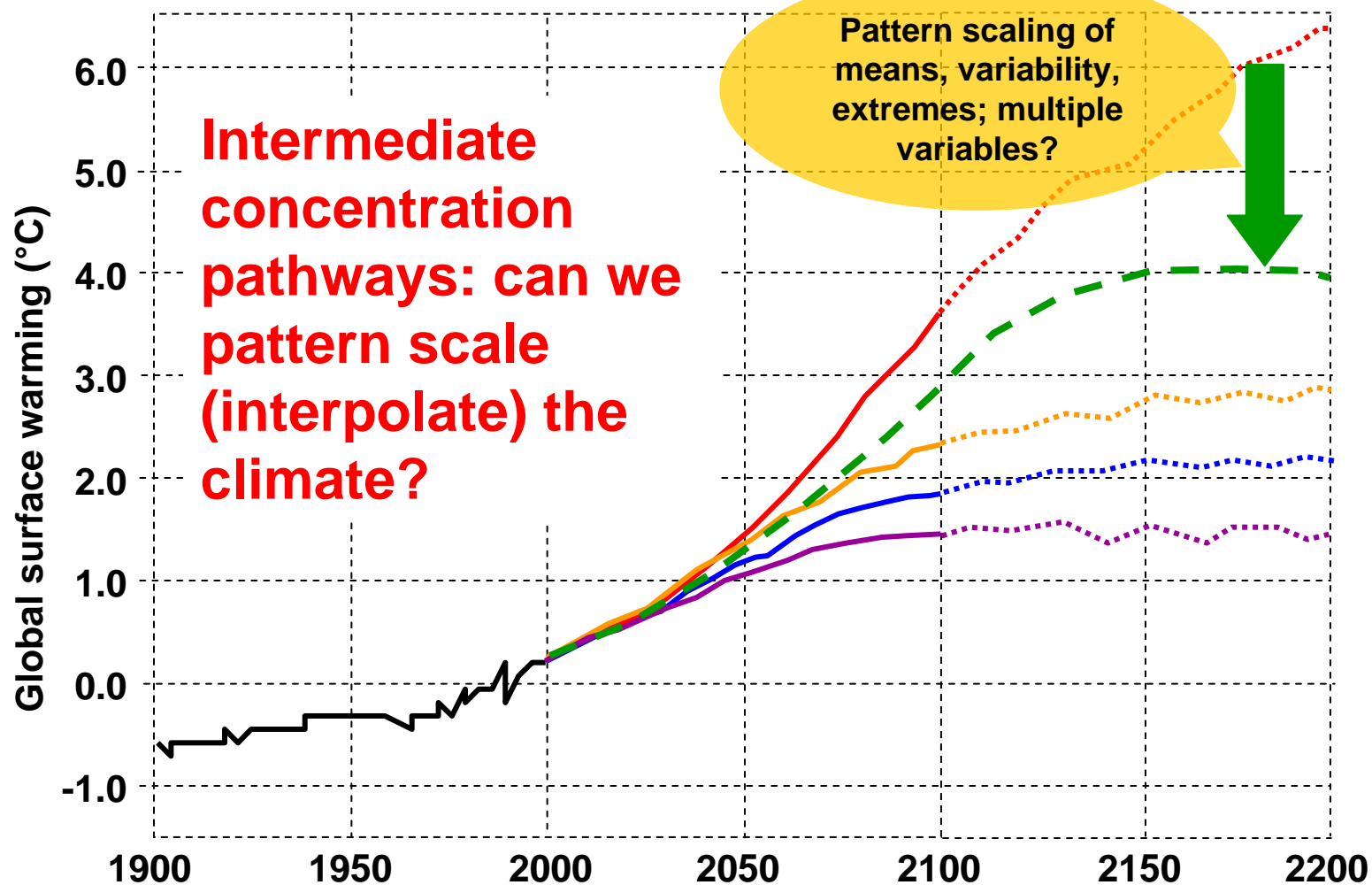
New regional climate projections

- National and regional climate data portals are complementing research-oriented data delivery (distributed system for AR5)
- Probabilistic frameworks are emerging for describing future climate and associated impact risks, which could be usefully exploited in AR5
- CORDEX (Coordinated Regional Downscaling Experiment) is a new programme designed to deliver downscaled climate information for the AR5
- Decadal forecasting vs. near-term climate projections
- Extreme weather events – is the treatment of these impact-relevant?
- Large scale climate events – are these appropriately accounted for?

Pairing climate and new emissions scenarios

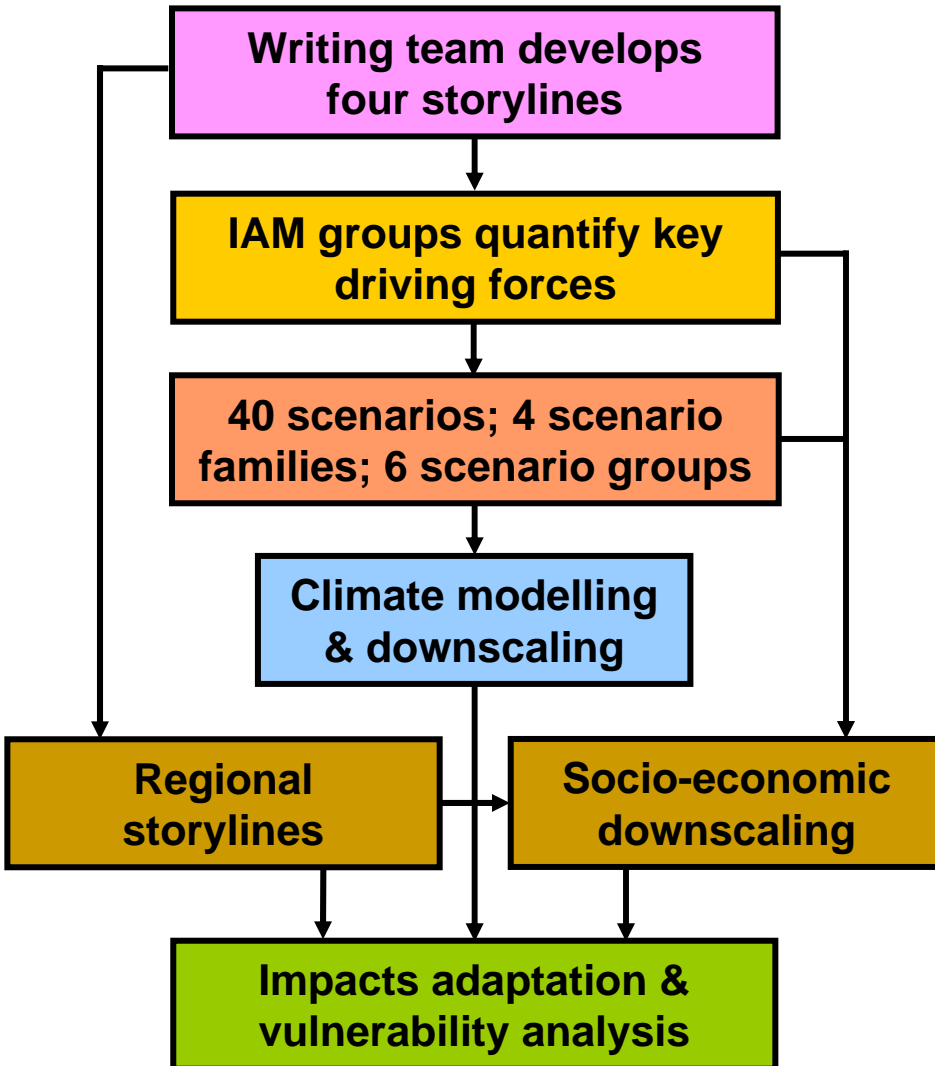
Hypothetical RCP-based scenarios



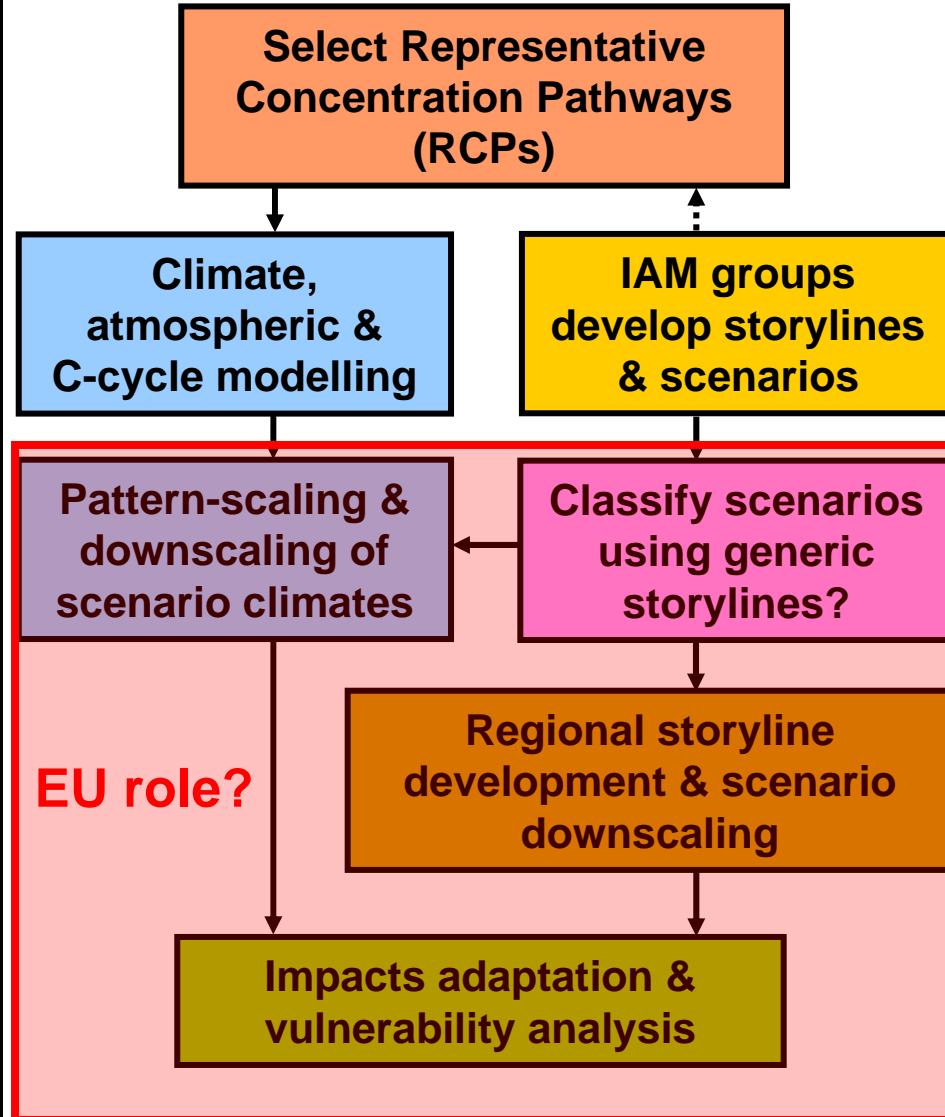


Scenario selection and the role of storylines

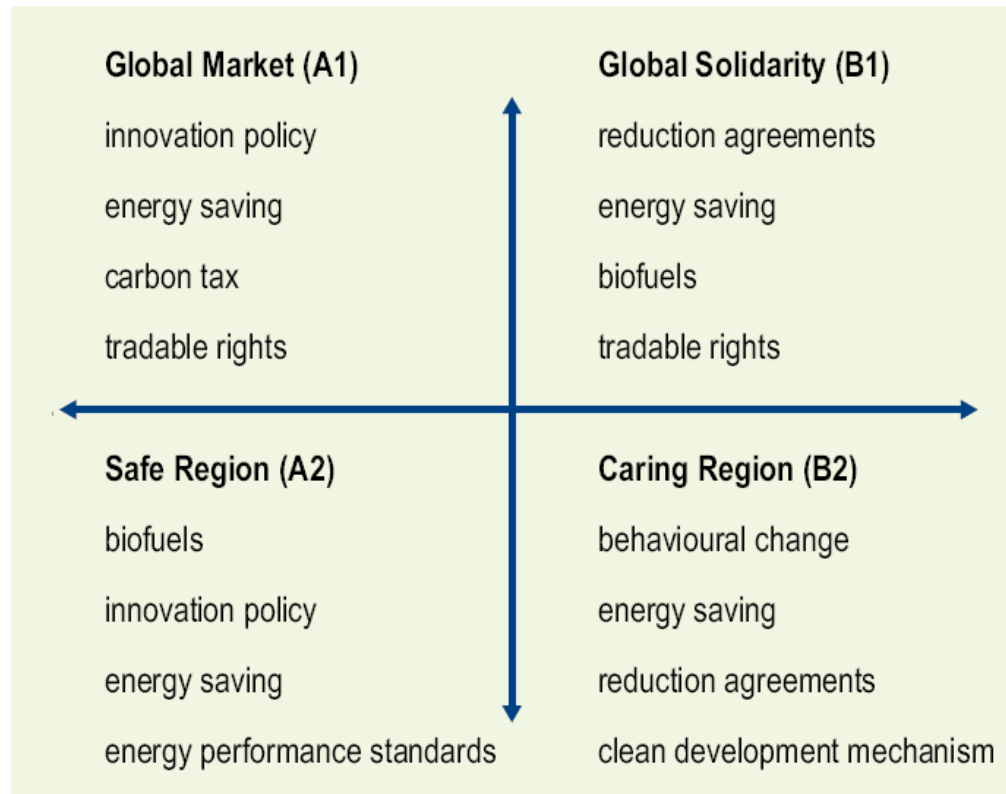
SRES



New scenarios



Interpretations of climate policy in the Netherlands according to four SRES-based world views



Source: Netherlands Environmental Assessment Agency, 2008

Storyline development

- Global storylines were already in place in SRES; are they needed to frame new scenarios?
- How should multiple new scenarios be classified?
- Do we need to select “marker” scenarios?
- How do we reconcile any new storylines with information from other scenario exercises (e.g. GEO-4, MA, PRELUDE, ESPON, EURECA, REGIONS 2020)?
- What downscaling approaches are required?
- How do we ensure buy-in from key stakeholders?
- How can European research contribute – do we need a separate effort on storyline development?

Some conclusions

- A **co-ordinating role** can be identified for scenario development, interpretation and guidance to serve European research projects
- **Timely delivery** of scenarios to the IAV community is essential (e.g. for IPCC AR5)
- **Storyline development** may be useful for framing consistent scenarios at global and regional scales and for classifying multiple new scenarios
- There are new research challenges for providing regional **climate-related scenarios**
- It is important that key stakeholders **buy-in** to new scenarios
- European IAV researchers have a key role internationally – **global IAV consortium** under development (recent initiative)

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Coasts, deltas and small islands



Tourism



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Scenarios of the future for adaptation

