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Assessing adaptation actions to climate change in fisheries and aquaculture

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FTP 650

Watkiss, Ventura and Poulain, 2019

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Presentation outline

- How much adaptation to do
- Challenges in assessing cost and benefits
- Early adaptation frameworks and existing assessment tools
- Towards guidance

How much adaptation to do?

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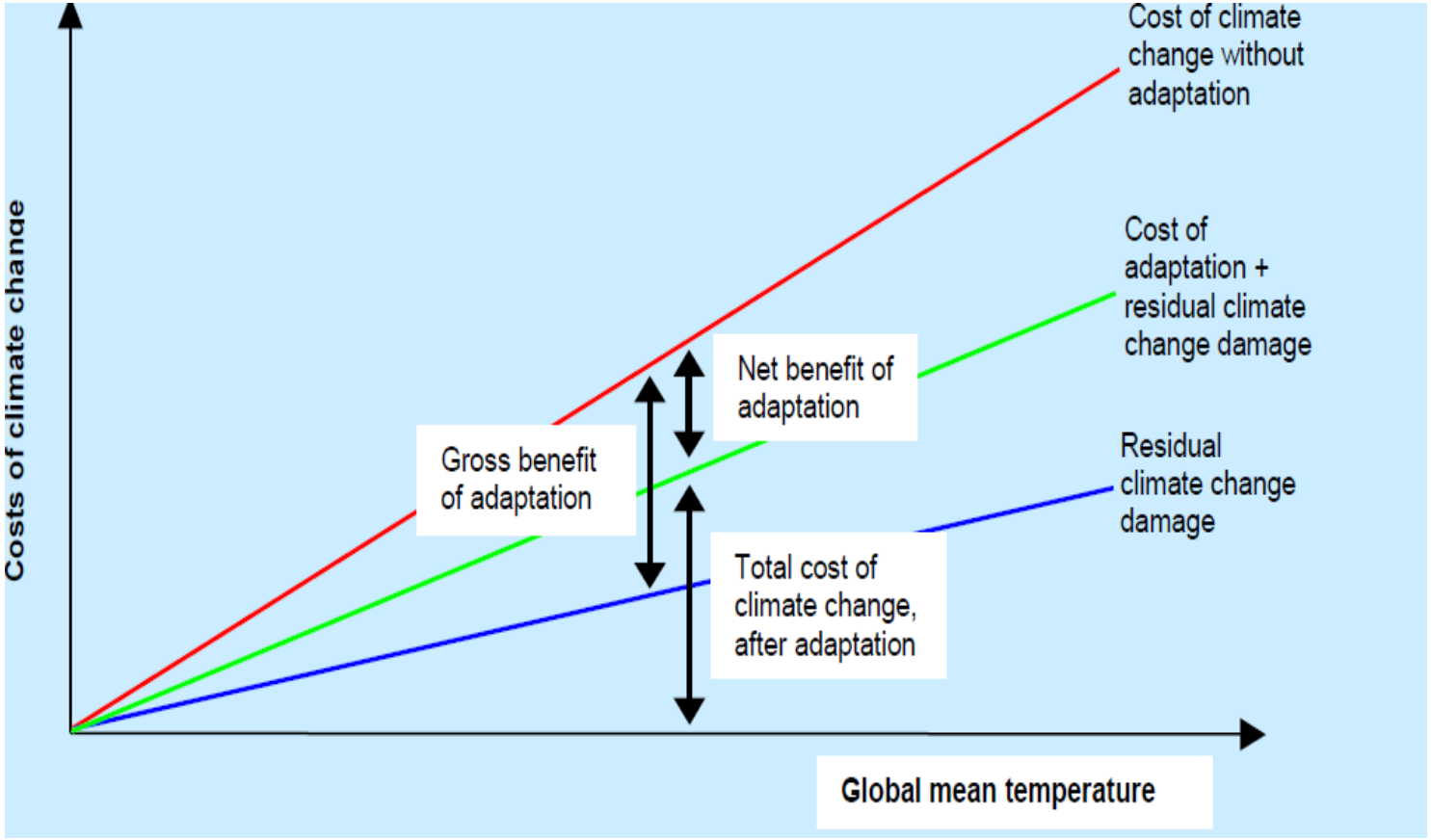
Cost of climate change w/without adaptation



Stern, 2006

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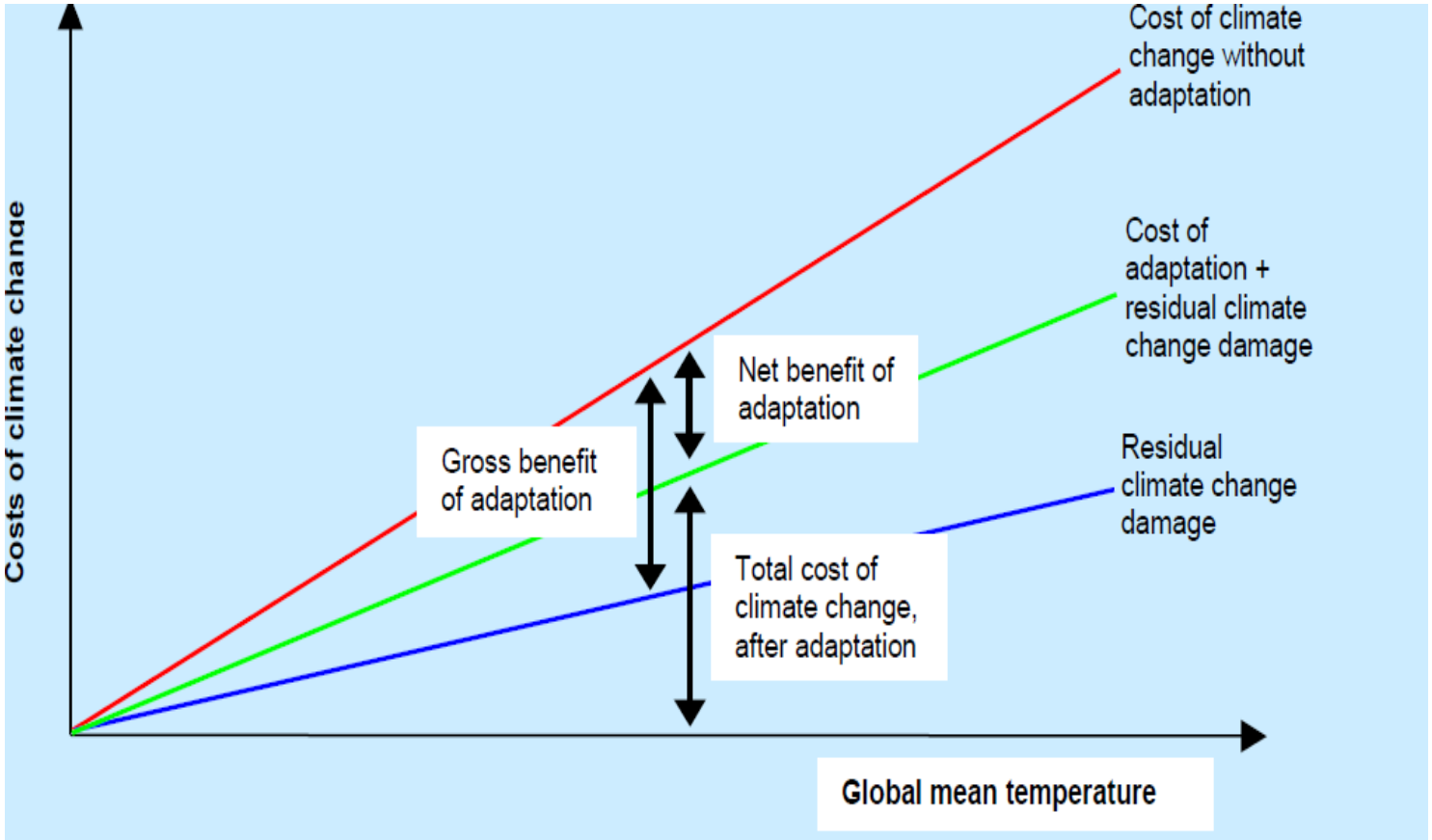
Cost of climate change w/without adaptation



Increase adaptation and adapt costs? or undertake less adaptation and bear higher residual cost?

Stern, 2006

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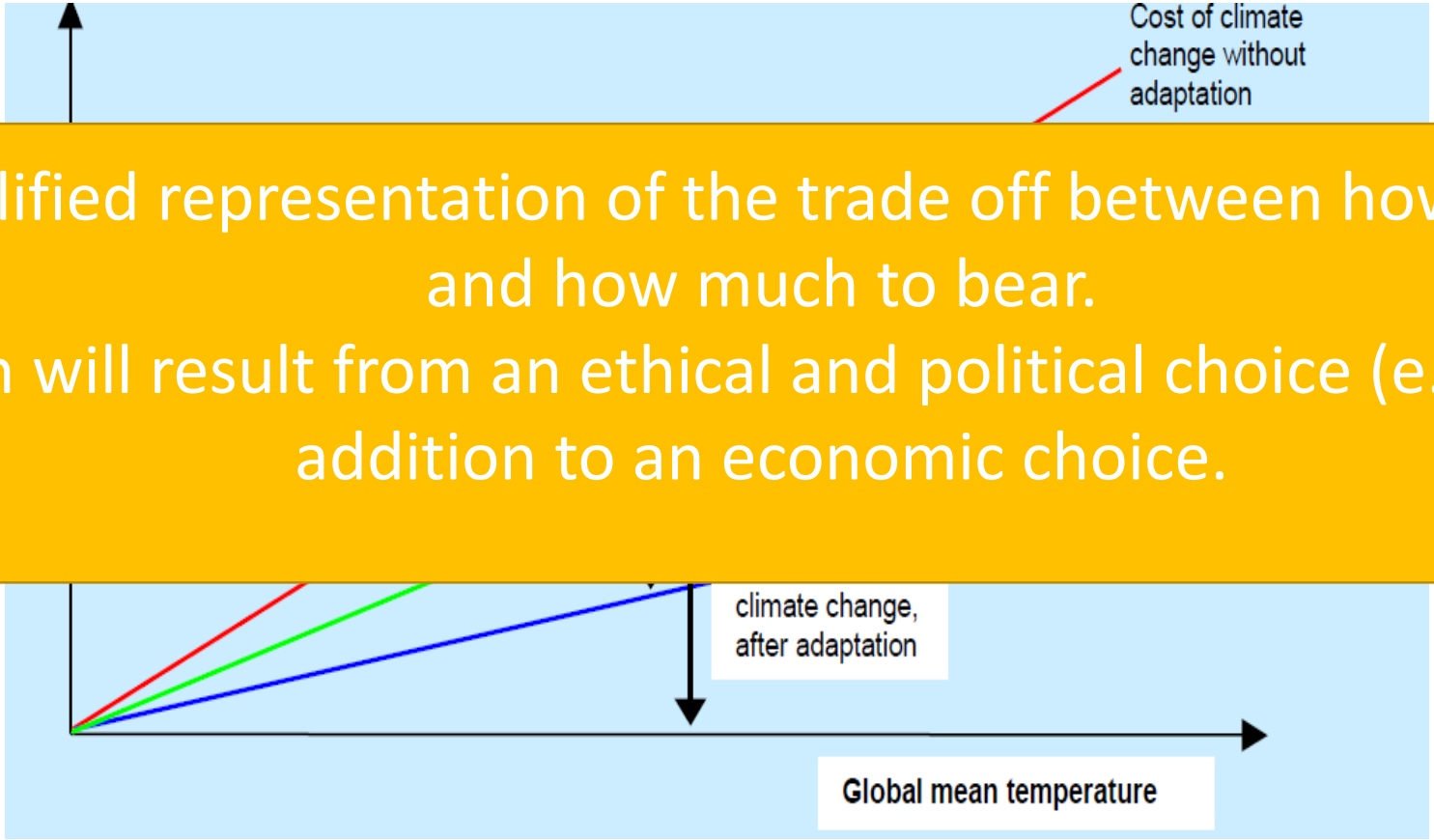
Cost of climate change



This is a simplified representation of the trade off between how much to invest and how much to bear.
The decision will result from an ethical and political choice (e.g. fatalities), in addition to an economic choice.

Stern, 2006

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Main challenges in assessing adaptation actions

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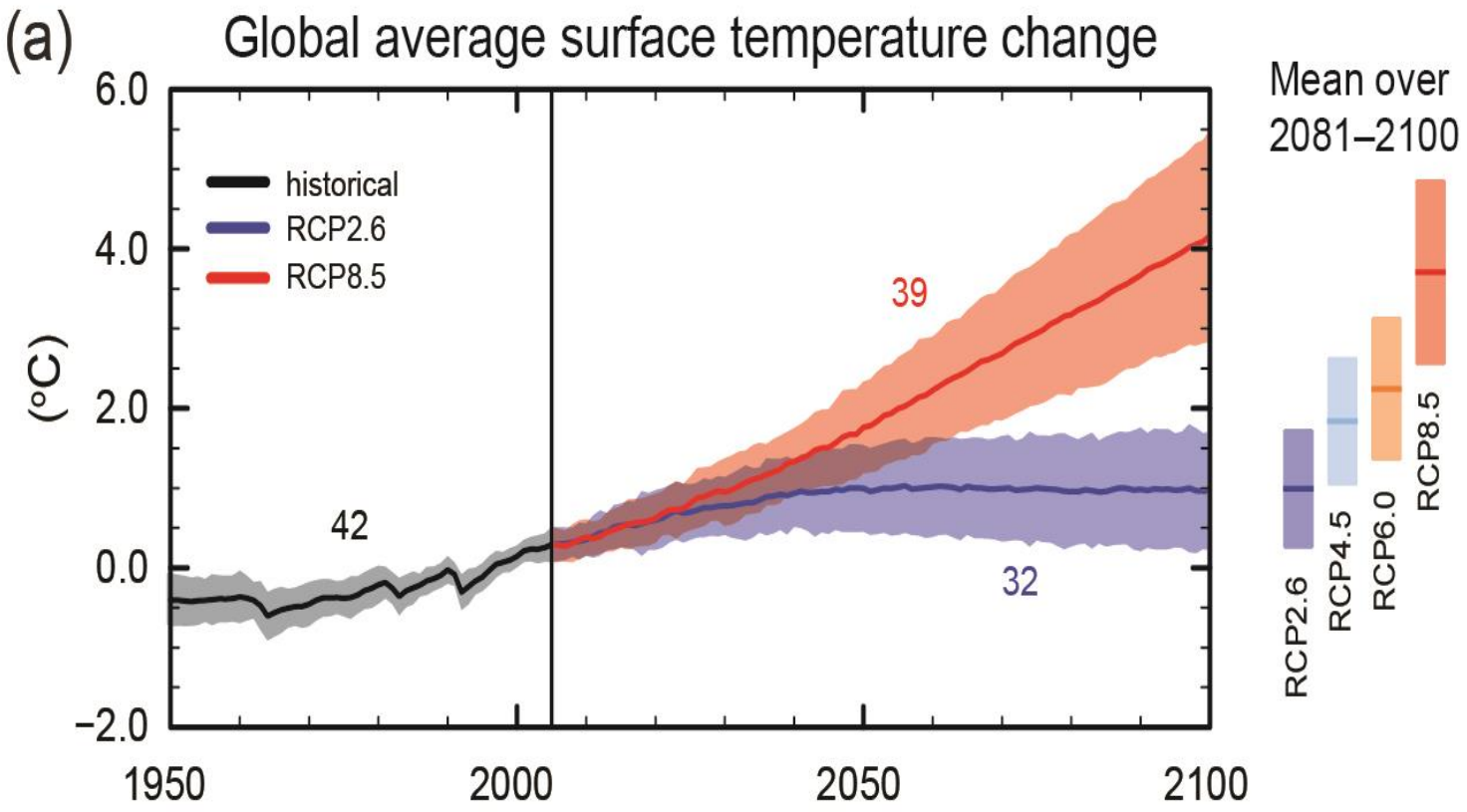
1. Climate change is uncertain

<2°C versus >4°C pathway?

This is a problem when we make decisions today

Need to recognise uncertainty not ignore it

This means we do things differently



IPCC, AR5, 2013

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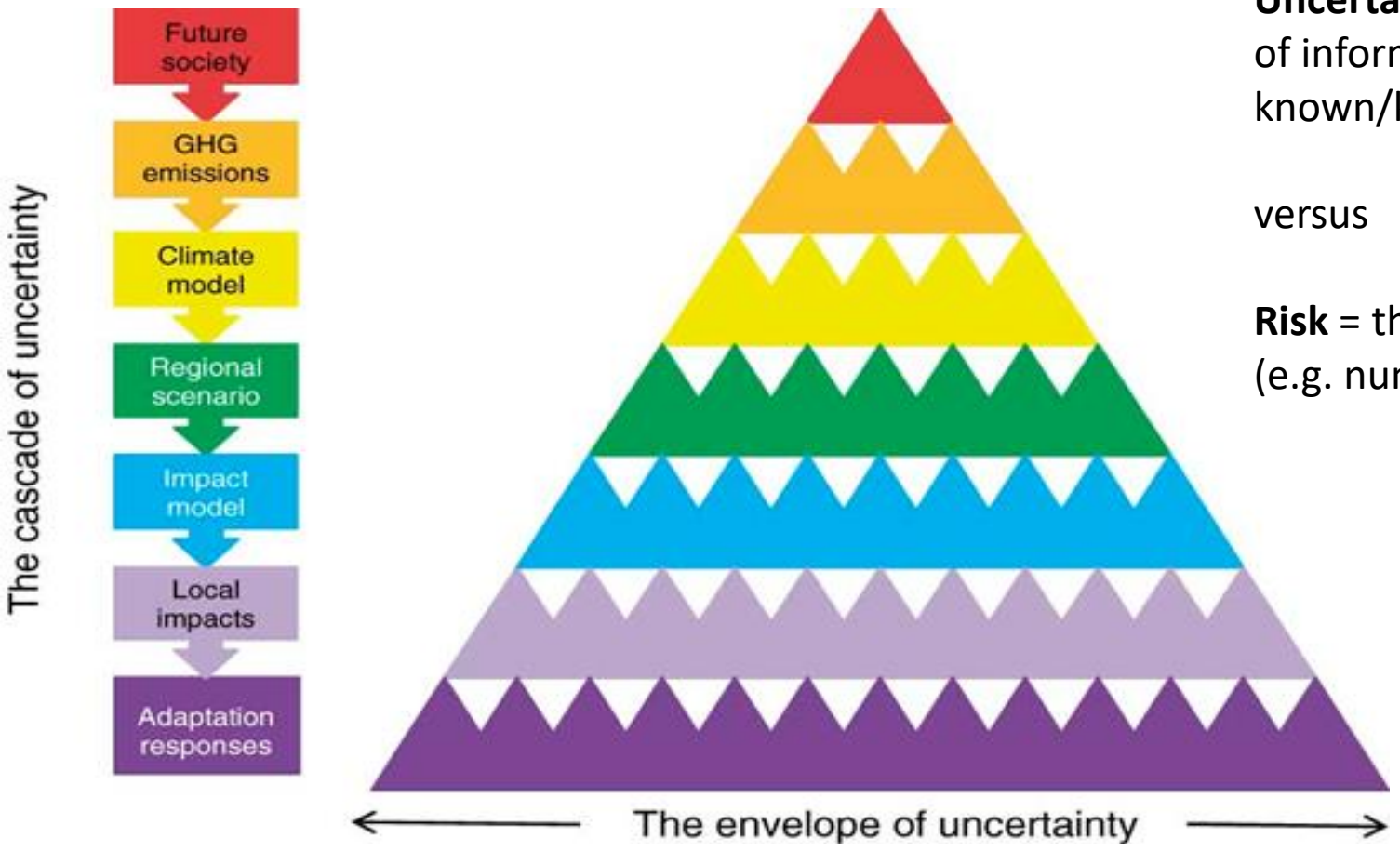
1. Climate change is uncertain



Uncertainty = incomplete knowledge due to lack of information or disagreement about known/knowable

versus

Risk = the likelihood measured by its probability (e.g. number of floods recorded in the past)

(Wilby and Dessai, 2010)

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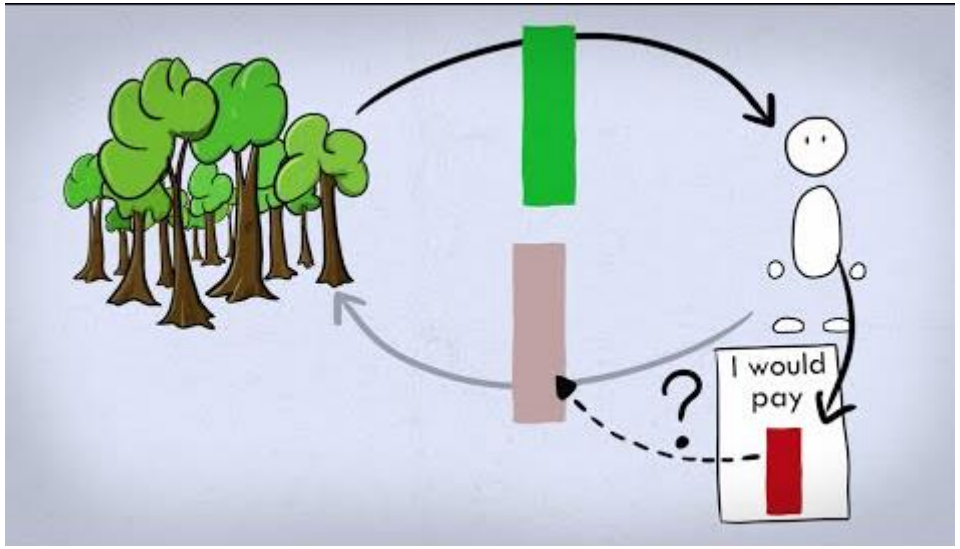
2. Measuring monetary and non-monetary costs and benefits

- Where markets exist, there are often prices available that can be used in appraisal.
- When no market prices exist, i.e. for non-market sectors (ecosystems)
  - There exist methods to assess value (e.g. WTP) but their application to adaptation is at an early stage.
  - Payment capacities.



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3. Time horizons and discount rates

- How much today's society should invest in trying to limit future climate change impacts (= discount rates)
- A high discount rate can imply little or no consideration for the well-being of future generations.
- These issues are less relevant for adaptation than mitigation, where decisions are often similar in nature to conventional policy decisions.
- However, it is potentially relevant when the choices made today (or the lack of action) produce irreversible impacts.

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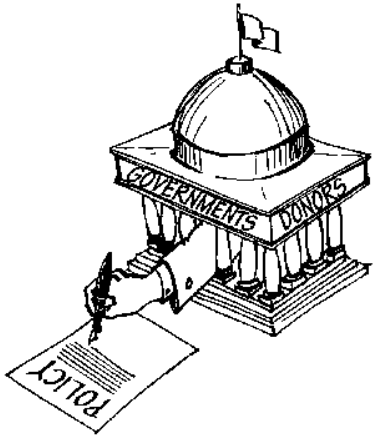
Different types of adaptations

International / Regional/ National / Watershed / Management Area

Institutional adaptation	Livelihoods Adaptation	Risk Reduction and Management for Resilience
Public Policies	Within sector	Risk Pooling and Transfer
Institutional Frameworks	Between Sectors	Early Warning
Legal Frameworks		Risk Reduction
Management and Planning		Preparedness and Response



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Different types of adaptations

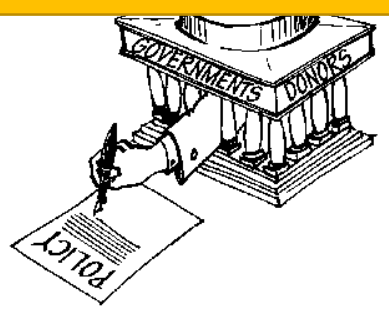
International / Regional/ National / Watershed / Management Area

Institutional adaptation

Livelihoods Adaptation

Risk Reduction and Management for Resilience

Early actions/decisions (to address current climate variability/extremes or longer term change)
Mainstreaming/integration of climate change into policy



Management and Planning

Preparedness and Response

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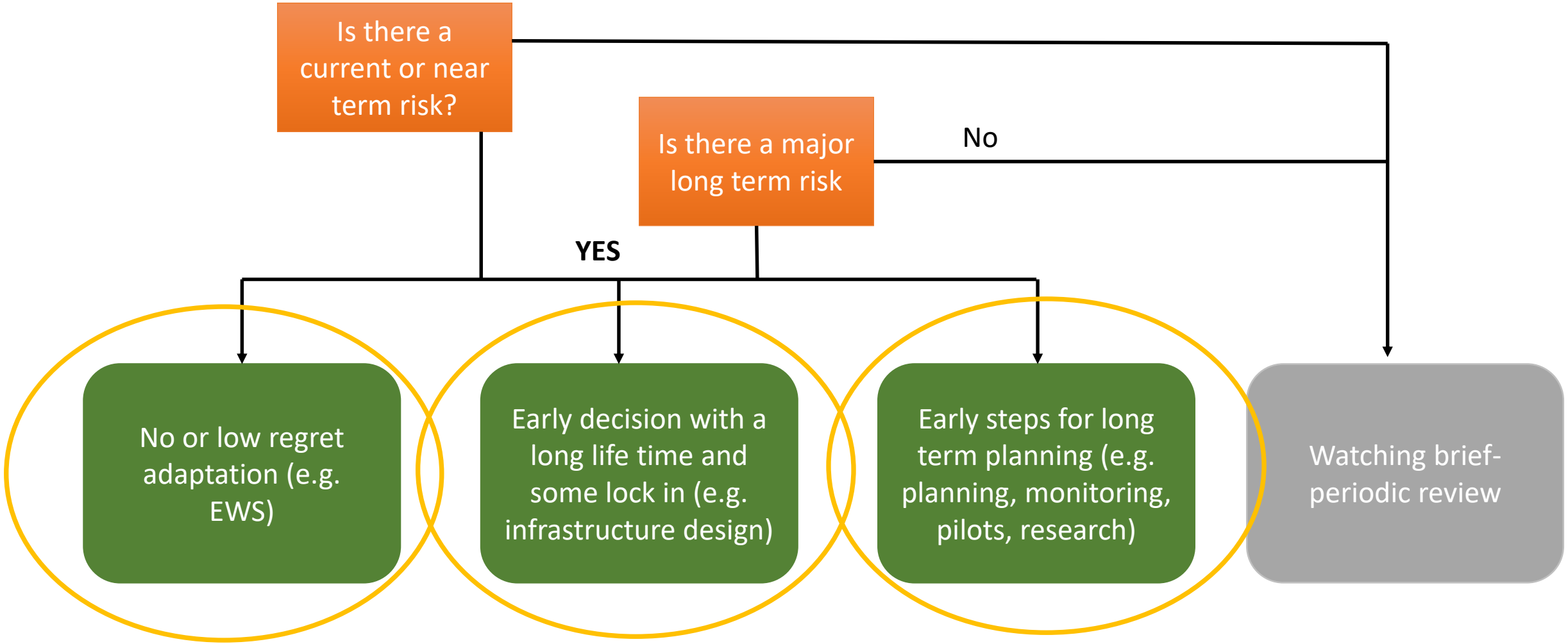
Early adaptation actions or what needs to be done first?



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Conventional methods for assessing short term adaptation options

Cost-benefit analysis	Well suited for low and no regret options in the near future Where clear market values can be used (often difficult for F+A) Does not explicitly deal with uncertainty Can be combined with sensitivity testing and probabilistic modelling
Cost-effectiveness analysis	Useful for short-term adaptation, for example when ranking low and no regret options Where pre-defined objective must be achieved (limited use for many ecosystem based approaches) Does not explicitly deal with uncertainty Can be combined with sensitivity testing and probabilistic modelling
Multicriteria analysis	Analysis of project using wide range of criteria (monetary and non-monetary) to rank projects (quite widely used in F+A) Can integrate uncertainty as an assessment criterion Relies on subjective expert judgement or stakeholder opinion

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Decision-making under uncertainty over medium-long term

Adaptive management

Uses iterative framework of monitoring, research, evaluation and learning to improve future strategies

Some applications to fisheries (e.g. Werners et al., 2013)

Real option analysis

The appraisal of large capital investment over the medium term
Where information on climate risk probabilities is available
When future changes in operation are possible
Deals explicitly with uncertainty by analysing the performance of adaptation for different potential futures

Some applications to fisheries (e.g. Wellman, Hunt and Watkiss, 2017)

Robust decision-making

Decision scaling

Portfolio analysis (PA)

Rule-based decision support

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Decision-making under uncertainty over medium-long term

Adaptive management

Policy appraisal over medium-long-term
When there are clear risk thresholds
Uses iterative framework of monitoring, research, evaluation and learning to improve future strategies

Limited empirical work to assess the merits of these assessment approaches to F+A adaptation

These approaches are challenging to apply in some developing country context (poor data)

Developing 'light touch' versions of these approaches for general application?

Robust decision-making (RDM)

Decision scaling

Portfolio analysis (PA)

Rule-based decision support

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Mainstreaming adaptation in fisheries policy

- Mainstreaming is the integration of climate change adaptation into current policy and development.
- Mainstreaming can leverage resources and activities.
- However, it does raise additional challenges given the difficulty in delivering cross-cutting and cross-sectoral policy and programmes.

Towards guidance

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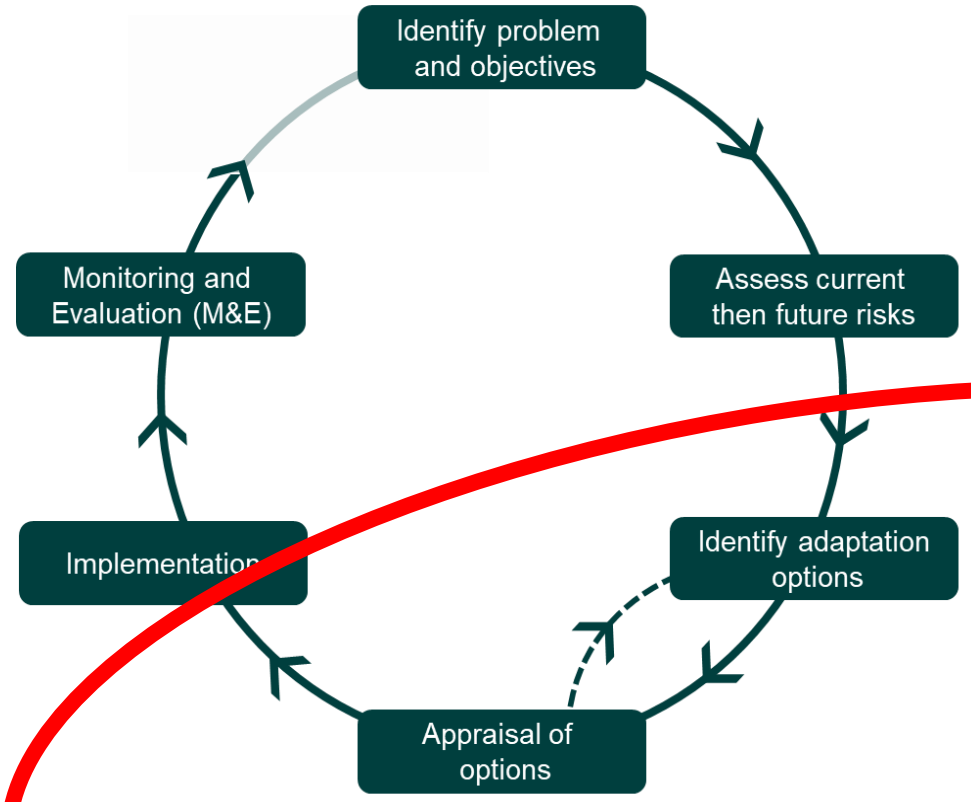
Step 1. Set out the goals and identify the type of adaptation problem being addressed. Establish barriers and justification for action.



Step 2. Start with current climate, then consider the timing and uncertainty of future risks, including lock-in

Step 3 Use adaptation frameworks to identify early adaptation priorities and sequence options over time

Step 4. Assess the costs and benefits of adaptation, using support methods including decision making under uncertainty

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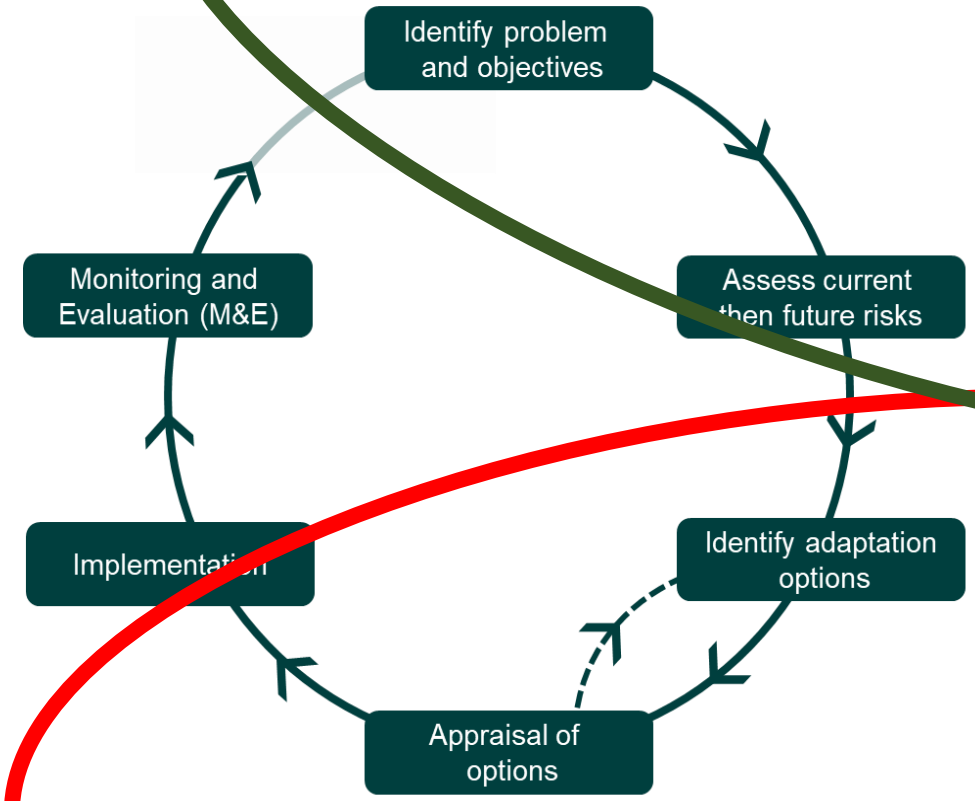
what do I need to do in the next five years'?



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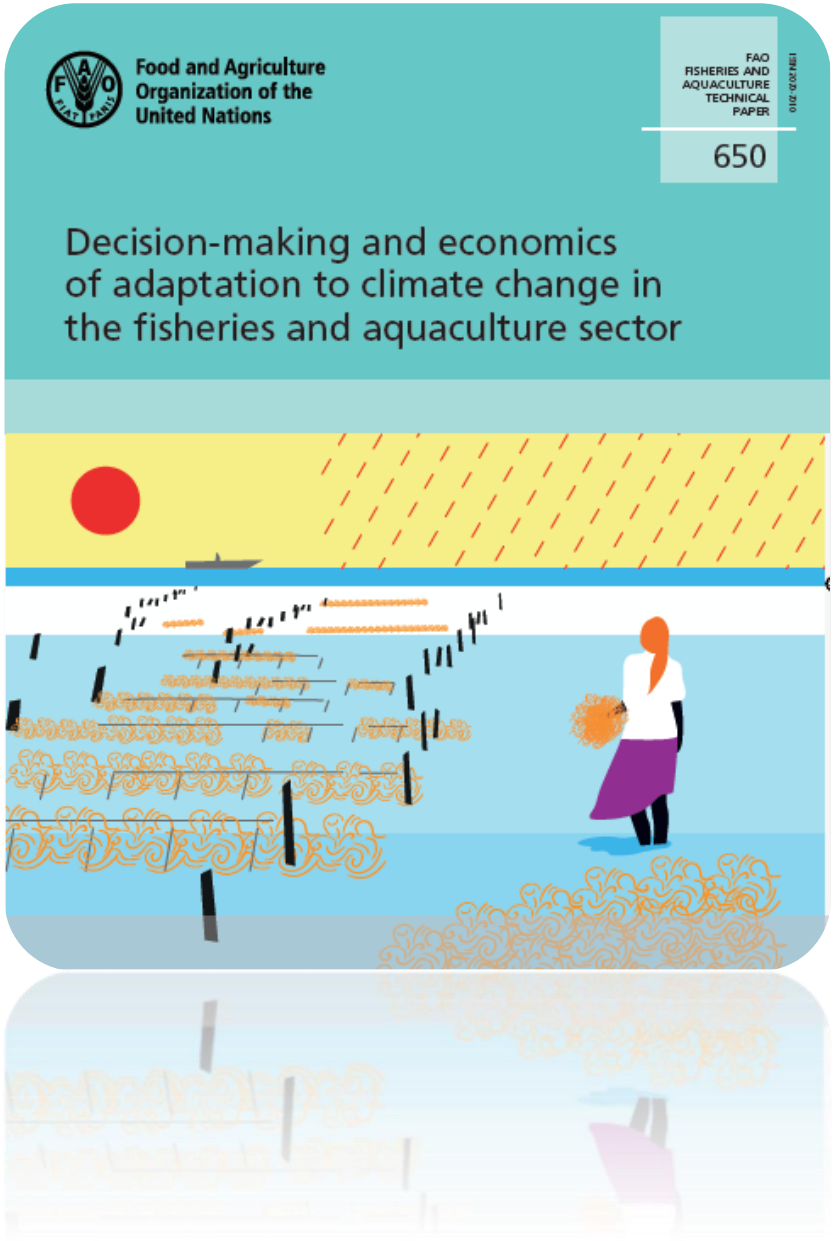

Watkiss, P., Ventura, A. and Poulain, F. 2019. *Decision-making and economics of adaptation to climate change in the fisheries and aquaculture sector*. FAO Fisheries and Aquaculture Technical Paper No. 650. Rome, FAO.

	WELL SUITED FOR	COMMONLY USED IN	DEALING WITH UNCERTAINTY
COST-BENEFIT ANALYSIS	• Low and no regret options in the near future • Where clear market values can be used	• Agriculture • Forestry • Energy • Water and coastal management • Transport	• Does not explicitly deal with uncertainty • Can be combined with sensitivity testing and probabilistic modelling
COST-EFFECTIVENESS ANALYSIS	• Short-term adaptation • Where benefits should be examined in non-monetary terms • Where pre-defined objectives must be achieved	• Health • Civil protection • Biodiversity protection	• Does not explicitly deal with uncertainty • Can be combined with sensitivity testing and probabilistic modelling
REAL OPTIONS ANALYSIS	• The appraisal of large capital investment over the medium term • Where information on climate risk probabilities is available • When future changes in operation are possible	Few applications exist, but include: • Construction • Regional planning • Energy • Forestry • Agriculture	• Deals explicitly with uncertainty by analysing the performance of adaptation for different potential futures
ROBUST DECISION MAKING	• The appraisal of investments over long time-scales • Where large uncertainties exist • Where a mix of quantitative and qualitative information needs to be considered	Few applications, but these include: • Water and coastal management • Agriculture • Energy • Health • Construction • Civil protection	• Deals explicitly with uncertainty • Analyses the performance of adaptation for different potential futures
ITERATIVE RISK MANAGEMENT / ADAPTIVE MANAGEMENT	• Policy appraisal over medium-long-term • When there are clear risk thresholds	• Water management • Coastal management • Agriculture • Health • Forestry	• Deals explicitly with uncertainty • Promotes iterative analysis, monitoring, evaluation and learning
PORTFOLIO ANALYSIS	• When a number of complementary adaptation actions are possible • When good economic and climate information exist	Few applications, but these include: • Water and coastal management • Forestry • Health • Fisheries • Agriculture • Biodiversity protection	• Deals explicitly with uncertainty • Examines the complementarity of adaptation options for dealing with future climates
MULTI-CRITERIA ANALYSIS	• Scoping options • Where a mix of quantitative and qualitative data needs to be considered	• Water and coastal management • Agriculture • Biodiversity protection	• Can integrate uncertainty as an assessment criterion • Relies on subjective expert judgement or stakeholder opinion

https://econadapt-toolbox.eu/methods