

Experiences with Dynamic Adaptive Policy Pathways

DMDU Training Day: Oxford

Marjolijn Haasnoot

Andrew Warren, Maaïke van Aalst Laurens Bouwer, Ad Jeuken, Sadie McEvoy (Deltares),
Pieter Bloemen (Delta Commissioner), Jan Kwakkel (Delft University)
Judy Lawrence (NZCCRI)



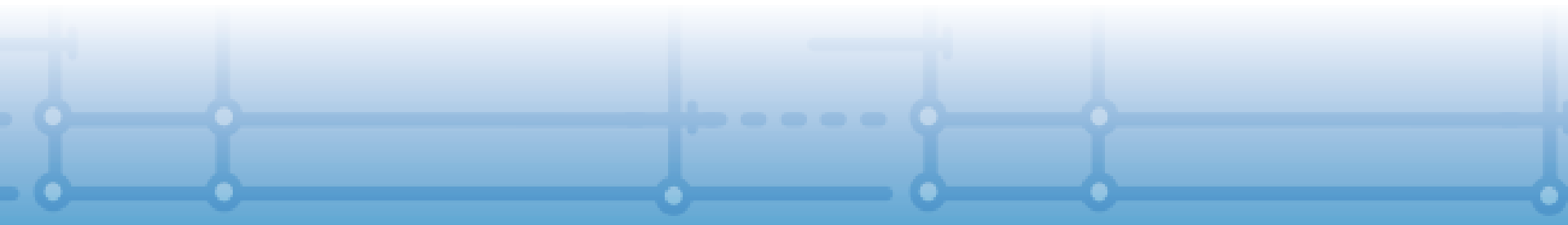
Dynamic Adaptive Policy Pathways (DAPP)

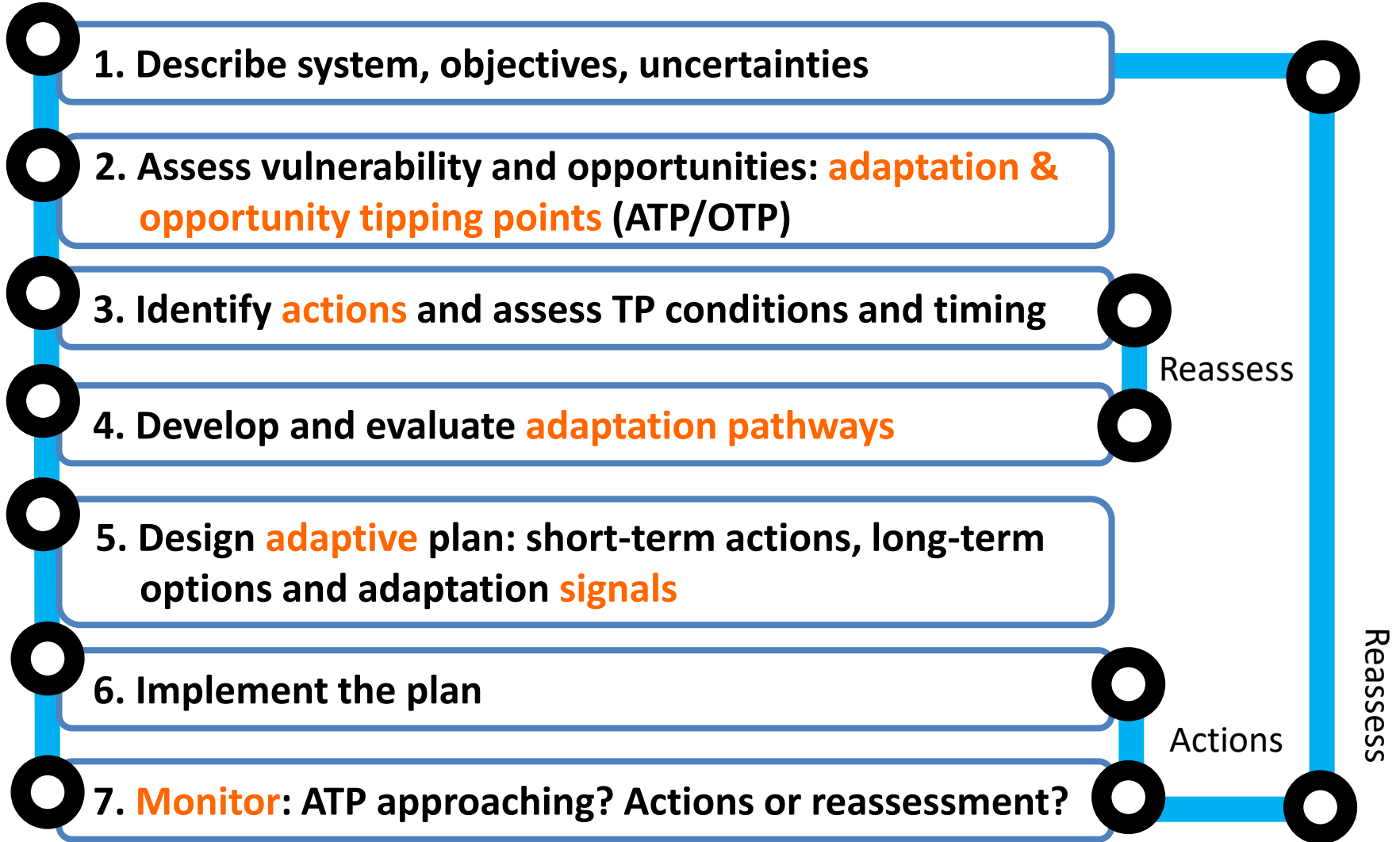
Decisions are made over time in dynamic interaction with the system and cannot be considered independently.

- An approach that explicitly includes decision making over time and sequences of decisions (pathways) under uncertainty.
- Supports planners to design a dynamic adaptive plans: short-term actions, long-term options, adaptation signals.

“Different roads leading to Rome”

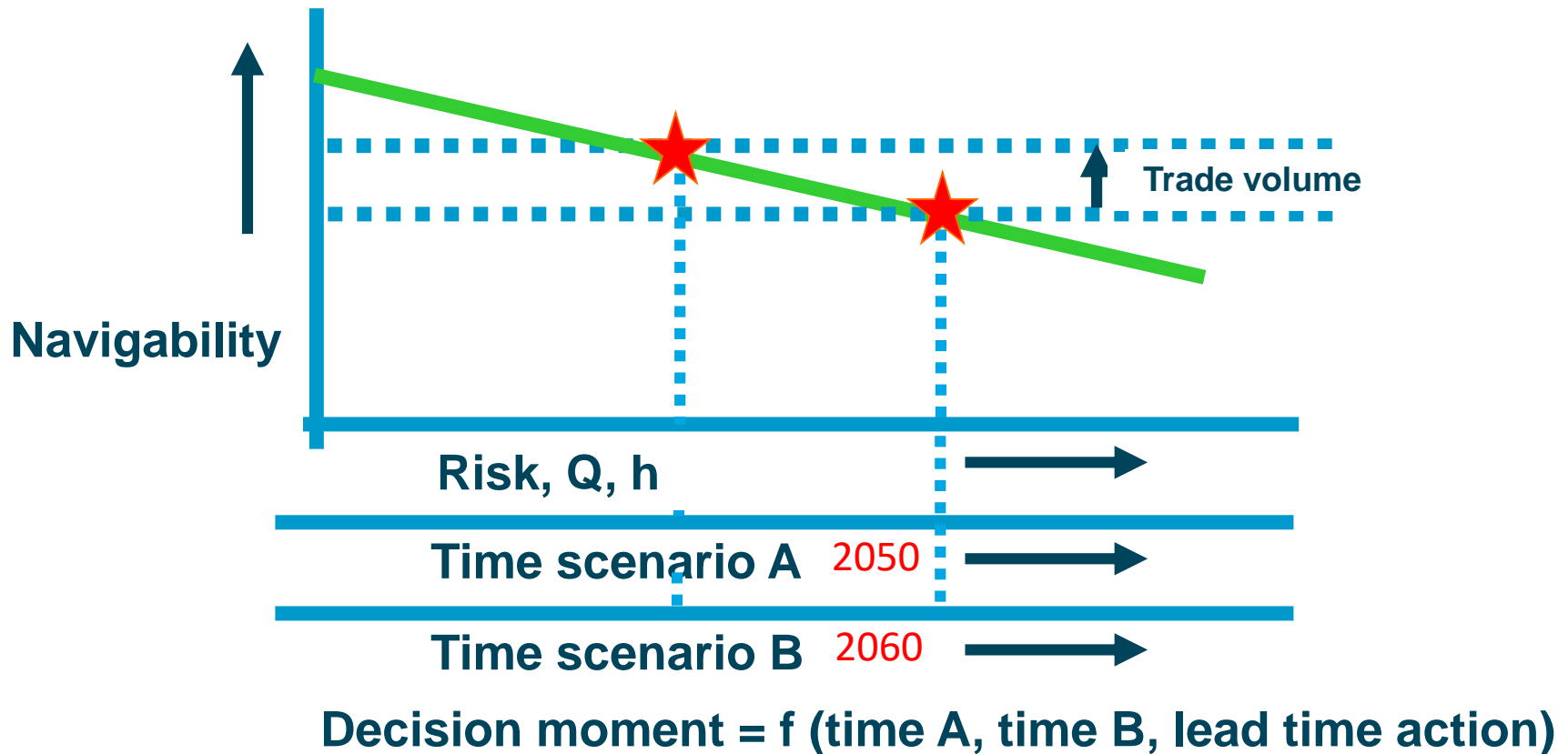
Approach





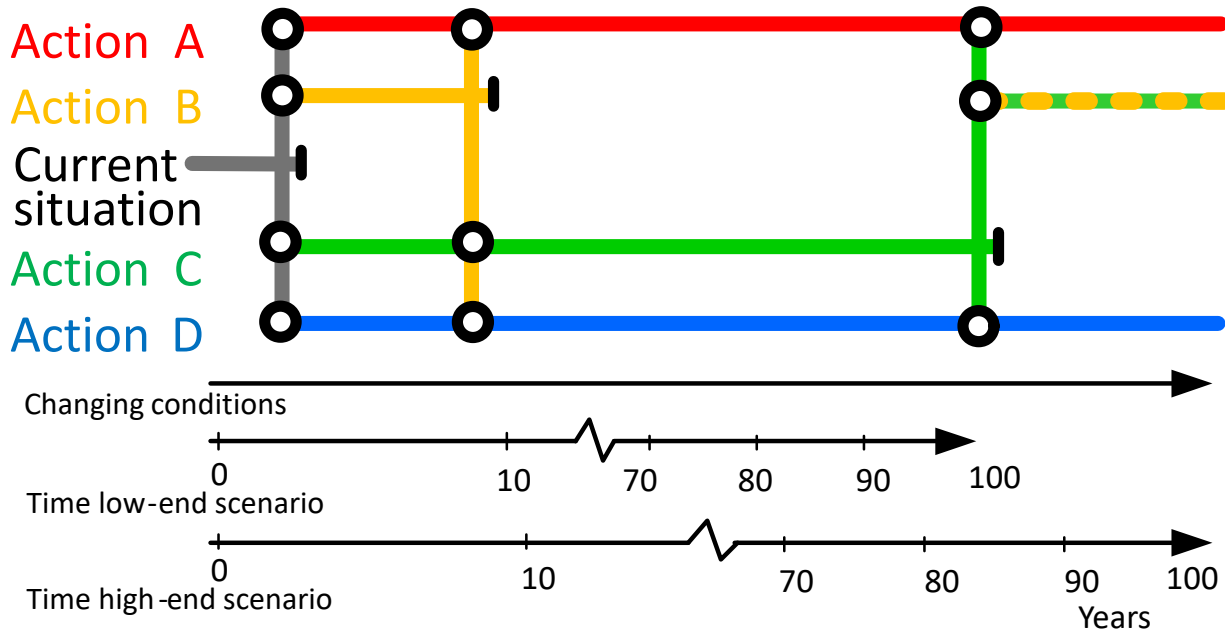
Adaptation Tipping Points

A stress test: **How much** (climate) change can we cope with?
When do start to miss our objectives?



Adaptation Pathways

Adaptation pathways maps show **different possible sequences of decisions** to achieve objectives. A scorecard helps to evaluate the pathways and decisions.



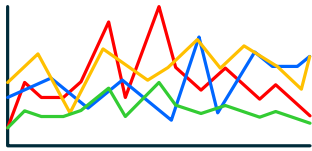
Time horizon 100 years				
Pathway		Costs	Benefits	Co-benefits
1	●	+++	+	0
2	● ●	+++++	0	0
3	● ●	+++	0	0
4	● ●	+++	0	0
5	●	0	0	-
6	● ●	++++	0	-
7	● ●	+++	0	-
8	● ●	+	+	---
9	●	++	+	---

- Transfer station to new policy action
- | Adaptation Tipping Point of a policy action (Terminal)
- Policy action effective

Flexible, generic approach

Can be used together with **Model-based**, **Expert judgement-based**, **Participatory**, or **Gaming** approaches

Ensemble (transient) scenarios
or sensitivity analysis

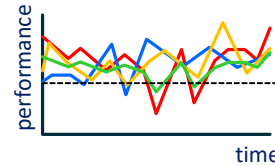


Set of actions and pathways

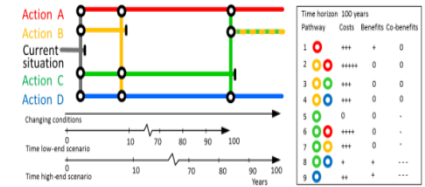


Participatory/qualitative
Workshop & storylines

Adaptation
Tipping Points



Adaptation pathways



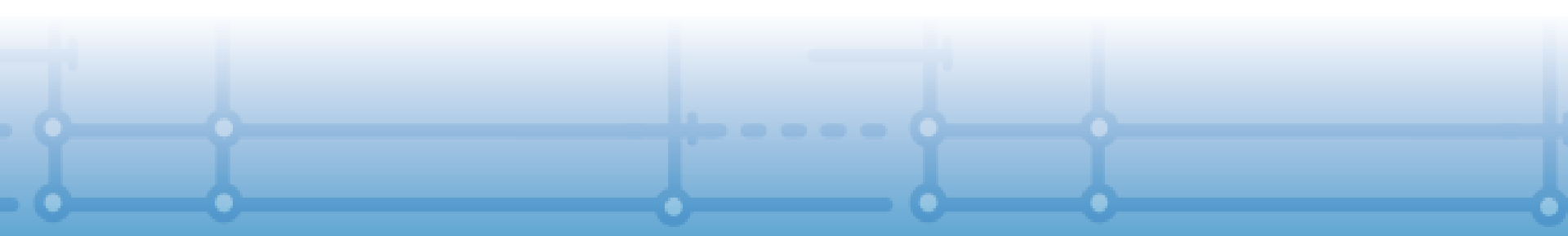
Pathways generator

If objectives and conditions cannot be translated into clear target indicators and values, relative values can also be used

Advantages of the approach

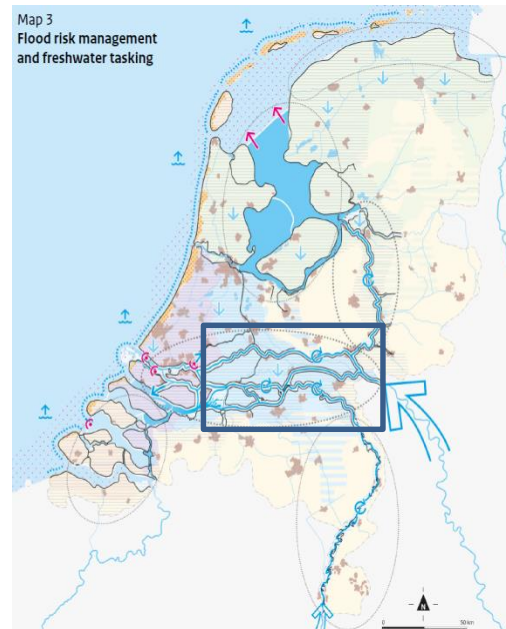
- Moves beyond climate services to **decision services**
- Adds **adaptiveness** (flexibility, robustness) and **time**
- **Pathways** open **decision space**, identify **path-dependencies** and overcome **policy paralysis**
- **Tipping points** identify **when** to take action
- **Monitoring** keeps us on track (needs further work)
- **Tools**: Awareness raising games, pathways generator
- **Assessment modes**: model-based, expert, participatory pathways

Project experiences with
adaptive planning from the Netherlands,
USA, New Zealand, Bangladesh, EU



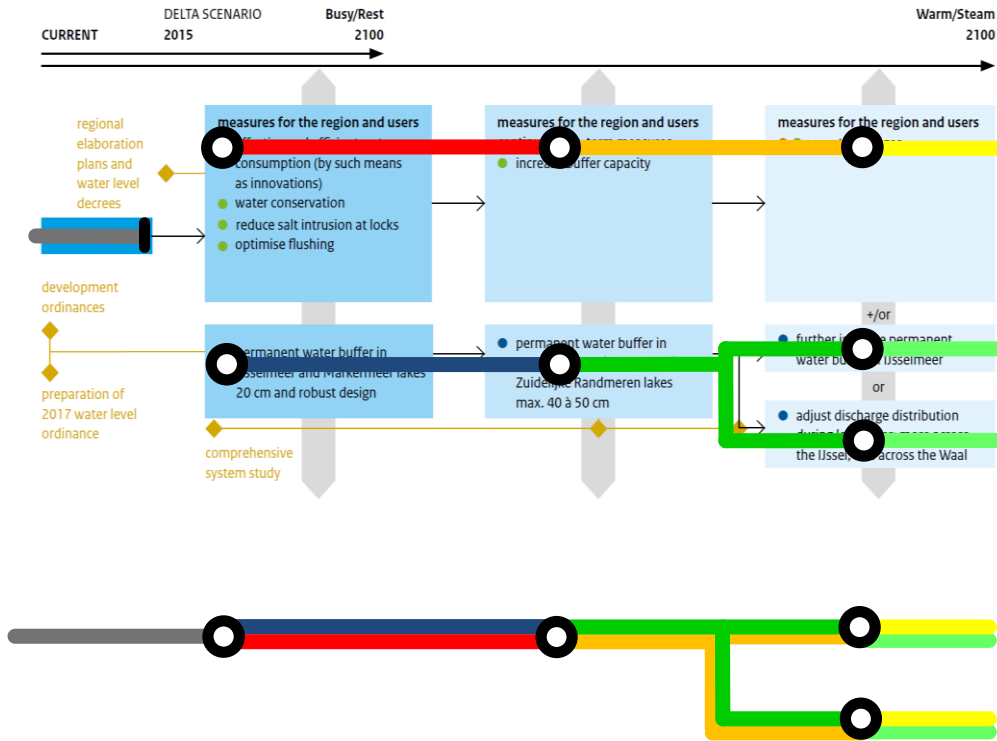
Delta Programme, The Netherlands

“Adaptation pathways offer a strong approach to show which options are needed and when they should be implemented and how long-term objectives influence short-term decisions.”
 (Delta Programme 2015)



Example: Rhine river Flood risk
 Haasnoot 2013. Anticipating Change

Delta Programme, The Netherlands

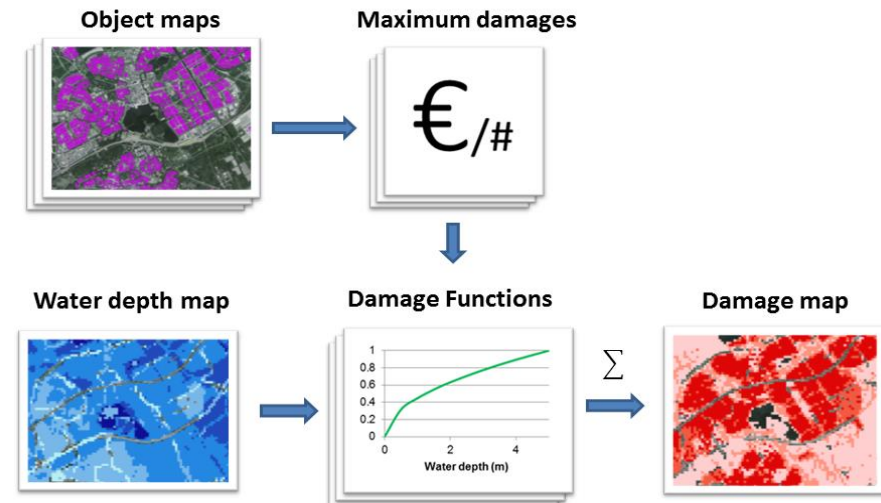
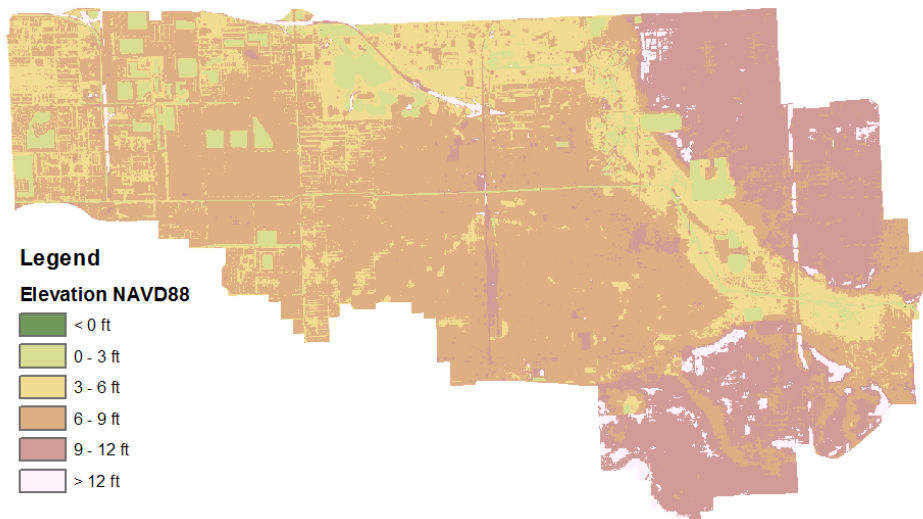


- Iterative participatory process
- Opens decision space
- Reduced number of pathways in the final plan
- Pathways based on short, medium, long term actions (not tipping points)
- Next step is monitoring

Flood mitigation pathways, Miami, Florida

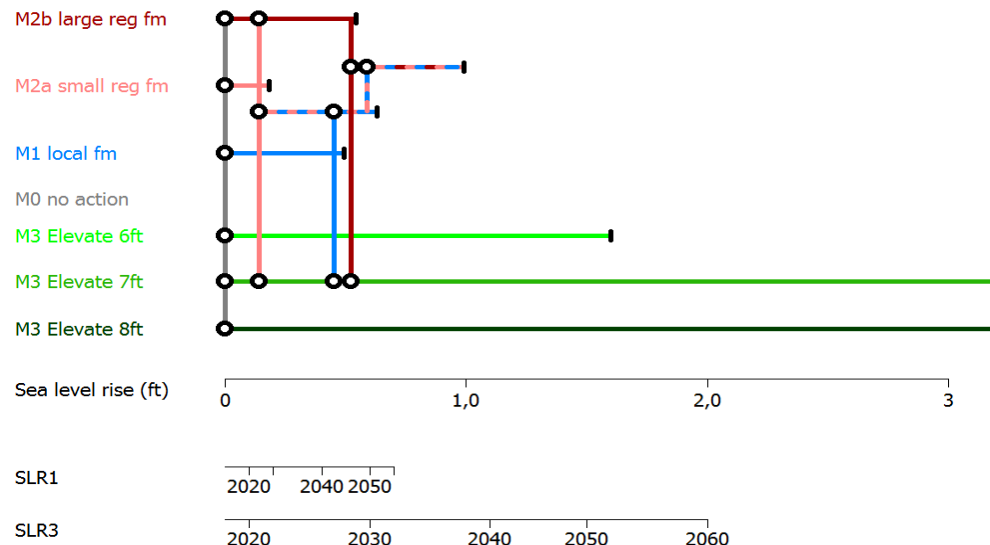
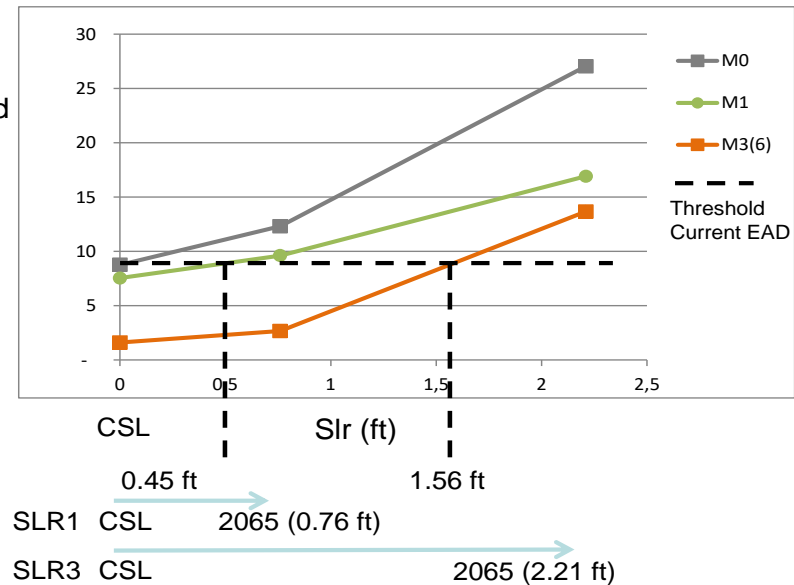
Investigate flood risk and sea-level rise impacts in the C-7 basin
3 alternative mitigation strategies:

1. Local flood mitigation: flood walls, exfiltration trenches, local pumps;
2. Regional flood mitigation: forward pumps at S-27;
3. Land-use mitigation: raising of roads and buildings to 6, 7, 8 ft



Flood mitigation pathways, Miami, Florida

- Flood risk assessed with hydraulic and damage models → expected annual damage (EAD) under SLR
- Adaptation Tipping points showed up to what sea-level rise same risk level is achieved
- Pathways showed: land use measures are needed in the end. Installing pumps can buy time

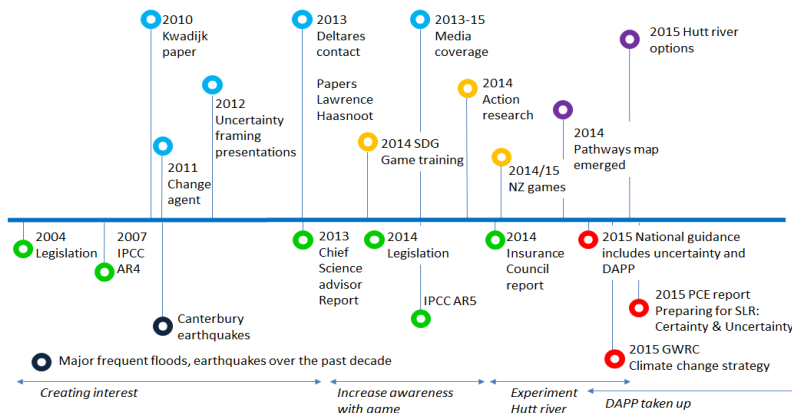


Pathways application, New Zealand

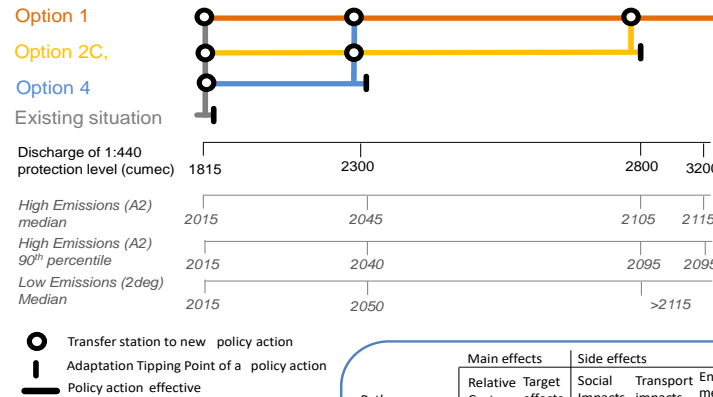
“Resilience through making decisions that are flexible and robust in the midst of ongoing change and uncertainty.”
AM involves staging interventions over time as trigger points are reached.



Judy Lawrence



Timeline of interventions. Blue=Creating interest, Yellow=Increasing awareness, Purple=Experiment Hutt river, Red=DAPP uptake, Dark Blue=Major hazards, Green = context.



Pathway	Main effects		Side effects		
	Relative Costs	Target effects	Social Impacts	Transport impacts	Environmental impacts
1	\$\$\$\$	++	---	+++	++++
2	\$\$	+	---	++++	+++
3	\$\$\$\$	++	---	+++	++++
4	\$	-	0	++	+
5	\$\$\$	+	---	++++	+++
6	\$\$\$\$	++	---	+++	++++
7	\$\$\$\$\$	++	---	+++	++++

- Used to assess the lifetime of options for a river scheme
- Included in regional Climate Change Strategy and Implementation Plan
- Included in national coastal guidance

Lawrence & Haasnoot (2017) *Environmental Science & Policy* 68, 47-57.

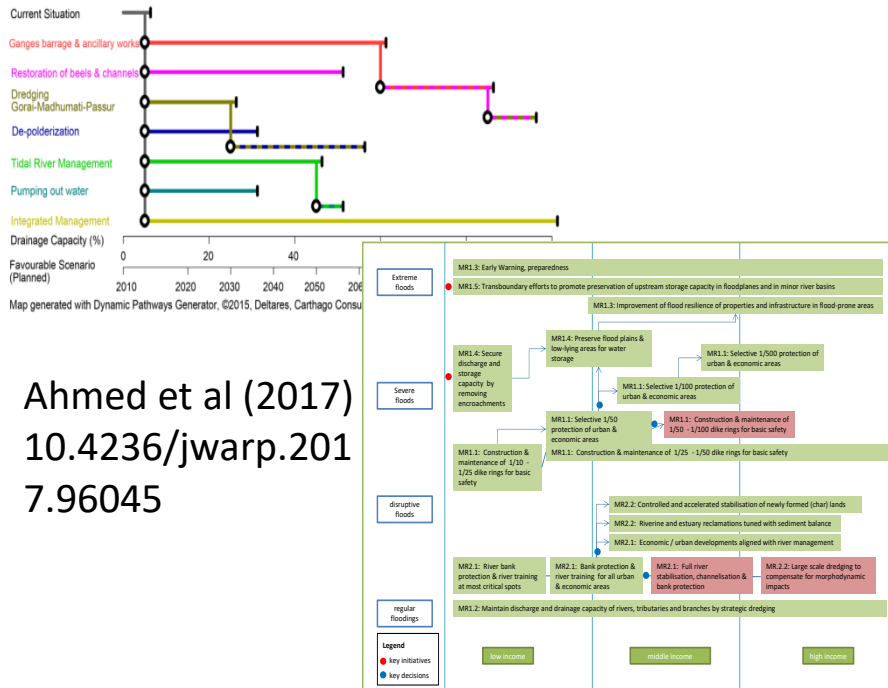


Bangladesh Deltaplan

Enable socio-economic development

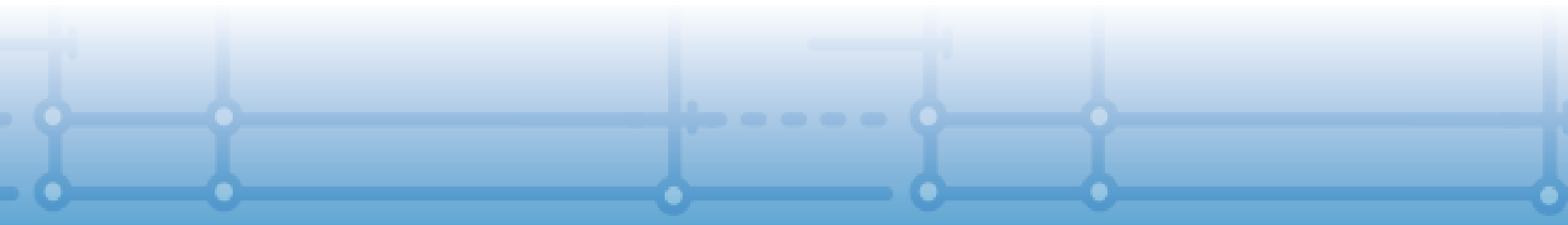


Delta Vision: Ensure long term water and food security, economic growth and environmental sustainability while effectively coping with natural disasters, climate change and other delta issues through robust, adaptive and integrated strategies, and equitable water governance.



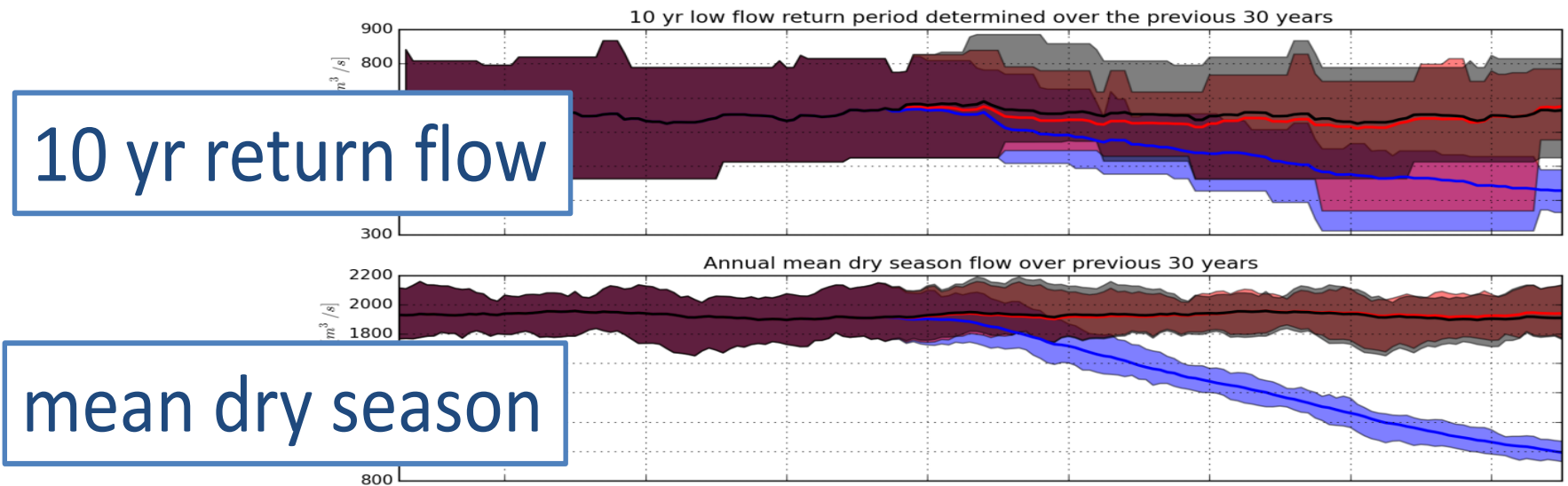
- Visioning and backcasting
- Iterative participatory process
- Investment plan
- Delta governance
- Update every 10 years
- Opportunity tipping points
- Fix the delta or live with water

Recent Advances



Adaptation signals

Designing appropriate monitoring signposts & trigger values



Looking for adaptation signals with transient scenarios:

Haasnoot et al. (2015) *Env. Res. Let.* [10.1088/1748-9326/10/10/105008](https://doi.org/10.1088/1748-9326/10/10/105008)

Designing monitoring arrangements: Hermans 2017 [10.1016/j.envsci.2016.12.005](https://doi.org/10.1016/j.envsci.2016.12.005)

Prioritising flood risk reduction actions in Europe under climate change

- For the majority of European countries, investing in improved dike protection is economically beneficial < 2050 .
- Adapting buildings only economically beneficial for some countries
- Uncertainties OTP: for several countries the OTP year occurs before 2040 with low SD across GCM projections

Opportunity Tipping Points

dike protection



adapted buildings



Thank you

marjolijn.haasnoot@deltares.nl

Special issue: Policy pathways for sustainability

Training day: Dynamic Adaptive Policy Pathways (February 2018?)

<http://pathways.deltares.nl>

<http://climate-adaptation.deltares.nl>

<http://deltagame.deltares.nl>

<http://www.deepuncertainty.org>

@lijnonline @deepuncertainty

