NAP-GSP
NATIONAL ADAPTATION PLAN GLOBAL SUPPORT PROGRAMME

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Prioritization of Climate Change Adaptation Options

The Role of Cost-Benefit Analysis

Session 3: CBA Steps 1, 2, and 3

Accra (or nearby), Ghana
October 25 to 28, 2016

8 steps

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Step 1: Define the scope of analysis.

Step 2: Identify all potential physical impacts of the project.

Step 3: Quantify the predicted impacts: With and without project

Step 4: Monetize impacts.

Step 5: Discount to find present value of costs and benefits.

Step 6: Calculate net present value.

Step 7: Perform expected value and/or sensitivity analysis.

Step 8: Make recommendations.

Outline of presentation

1) Step 1

2) Step 2

3) Step 3

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Step 1: Define the scope of analysis

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Meaning:

- **Who to include in the analysis? Whose costs and benefits will be included?**
- **Should it be local? Provincial? National? Global?**
- **This is sometimes referred as a scoping issue.**

Step 1: Define the scope of analysis

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Geographical scoping

How about river diversion from one country to another?

How about air pollution emitted by one country and impacting another country?

How about a hydro-power project in one country impacting river flow in downstream countries?

How about untreated wastewater discharge from one city having an impact on water quality in another city of a different province within the same country?

Step 1: Define the scope of analysis

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Geographical scoping

- **Mis-specifying the geographical scope of the analysis can lead to significant under-estimates of the costs and benefits of the project.**
- **There is no easy rule on how to specify correctly the geographical scope of the analysis.**

Step 1: Define the scope of analysis

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In general:

The geographical scope coincides with the jurisdictional area over which the implementing government has authority.

- **A project implemented and paid for by a local government will most probably use a local scope of analysis.**
- **A project implemented and paid for by a national government will most probably use a national scope of analysis.**
- **Since multi-lateral development banks (MDBs – such as World Bank) lend money to national governments, all projects financed by MDBs use a national scope when conducting economic analysis.**

Step 1: Define the scope of analysis

GROUP DISCUSSION

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Please consider the Tonle Sap Basin Flood Control Project

6. The proposed flood protection will also generate incremental tourism benefits. Currently, the town is receiving 5,076 foreign visitors and 16,320 local visitors. From 2013 to 2018, a 5% annual growth rate in tourism was assumed. With the project completion, an 8% annual growth rate from 2019 to 2044 was used, while the without-the-project scenario assumed a more conservative annual growth rate of 5% given other planned developments benefiting the town. Foreign visitors spend an average of $50/day and stay an average 1.5 days without the project. Local visitors spend about $25/day and stay an average of 2 days. With the project, it was estimated that foreign and local visitors will extend their stay for an average of 1 day and will spend an additional $20/day and $5/day, respectively. For conservatism, only 30% of the calculated incremental tourism benefits were attributed to the flood protection subproject. TA 7986-CAM consultant estimates based on discussions with the KCH Provincial Department of Tourism.

Step 1: Define the scope of analysis

GROUP DISCUSSION

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Please consider the Tonle Sap Basin Flood Control Project.

This project would receive financial support from ADB to the Government of Cambodia.

In this context, please discuss whether or not it is appropriate to include tourism benefits in the economic analysis.

Step 1: Define the scope of analysis

GROUP DISCUSSION

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Please consider the Anhui Sustainable Transport Project.

13. Transport externalities. The project will reduce carbon dioxide (CO2) emissions by 652,700 tons from 2013-2035. An estimated 247,200 tons of CO2 will be emitted because of construction works. The highway upgrades will have mixed effect on emissions—they will be increased by the higher speeds and added traffic that will result, but decline due to less congestion and smoother road surfaces. A net overall reduction in emissions of 137,600 tons was estimated over 20 years. The IWT component will lead to a net reduction in CO2 emissions of 762,300 tons over 30 years due to the shift from higher-emission road transport to waterway transport. CO2 emissions were evaluated at a constant $25 per ton.

Step 1: Define the scope of analysis

GROUP DISCUSSION

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Please consider the Anhui Sustainable Transport Project.

CO2 emissions were evaluated at a constant $25 per ton, where $25 is the reported global social cost of carbon.

Please discuss the use of the global social cost of carbon in the economic analysis of this investment project in China.

Step 1: Define the scope of analysis

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GROUP DISCUSSION

GIZ. 2016. COST-BENEFIT ANALYSIS OF INDC ADAPTATION AND MITIGATION OPTIONS OF GHANA

Define the scope of analysis

	INDC Policy Actions	Programme of Action
Priority 1	Scale up renewable energy penetration by 10% by 2030	Scale up rooftop solar systems to 200,000 households
Priority 2	Fuel diversification	Fuel diversification in thermal power supply
Priority 3	Scale up renewable energy penetration by 10% by 2030	Scale-up solar mini-grid to 255 to serve an estimated 1,200 island and lakeside communities
Priority 4	Agriculture resilience building in climate vulnerable landscapes	Double 10,000 ha annual reforestation/afforestation of degraded lands
Priority 5	Agriculture resilience building in climate vulnerable landscape	Promote climate smart agriculture in the savannah landscapes of Ghana

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Define the scope of analysis

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Define the scope of analysis

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Scale up rooftop solar systems to 200,000 households.

The report says:

Benefit 1: Job creation opportunities through installation and maintenance of solar systems
Benefit 2: Reduced consumption of fossil fuel for power generation.
Benefit 3: Increased electricity access to rural communities and contributed to realize energy security.
Benefit 4: Saving in national electricity demand.

Let's look at Benefit 2 (Reduced consumption of fossil fuel for power generation).

Define the scope of analysis

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ANNEX 3: RESULTS OF COST BENEFIT ANALYSIS

Year	Rooftop systems installed	Cumulative CO2 reduction (kt)	Savings from CO2 reduction (USD million)
2016	15,000	49.93	1.44
2017	40,000	127.82	3.83
2018	90,000	287.60	8.63
2019	150,000	499.34	14.38
2020	200,000	639.12	19.17
2021	230,000	734.99	22.05
2022	264,500	845.23	25.36
2023	304,175	972.02	29.16
2024	349,801	1,117.82	33.53
2025	402,271	1,285.50	38.56
2026	442,499	1,414.04	42.42
2027	486,748	1,555.45	46.66
2028	535,423	1,710.99	51.33
2029	588,966	1,882.09	56.46
2030	647,862	2,070.30	62.11

Define the scope of analysis

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ANNEX 3: RESULTS OF COST BENEFIT ANALYSIS

Year	Rooftop systems installed	Cumulative CO2 reduction (kt)	Savings from CO2 reduction (USD million)	"Savings" per kt of CO2
2016	15,000	49.93	1.44	34.67361
2017	40,000	127.82	3.83	33.37337
2018	90,000	287.60	8.63	33.32561
2019	150,000	499.34	14.38	34.72462
2020	200,000	639.12	19.17	33.33959
2021	230,000	734.99	22.05	33.33288
2022	264,500	845.23	25.36	33.32926
2023	304,175	972.02	29.16	33.33402
2024	349,801	1,117.82	33.53	33.33791
2025	402,271	1,285.50	38.56	33.33766
2026	442,499	1,414.04	42.42	33.33428
2027	486,748	1,555.45	46.66	33.33583
2028	535,423	1,710.99	51.33	33.33314
2029	588,966	1,882.09	56.46	33.33493
2030	647,862	2,070.30	62.11	33.33280

Define the scope of analysis

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So, it would seem that the CO2 mitigation benefits of rooftop solar systems has been assessed using the global social cost of carbon.

GROUP DISCUSSION

Please discuss.

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Step 2: Identify all potential impacts

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Meaning:

- **List ALL impacts of the projects, including the required inputs of the project (e.g. labor, capital, etc.), and all the outputs of the project.**

- **If the project (or the activity) is to improve access to sanitation, or to improve solid waste management, or to reduce the frequency or extent of flooding, then in order to provide an economic assessment of the potential benefits of the project, we first need to list all the impacts associated with the lack of sanitation, or the lack of proper of solid waste management, or the floods.**

Step 2: Identify all potential impacts

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Difficulties:

- **Many of the impacts may not be known;**
- **Science is incomplete and often can be contradictory.**
- **At best, the data is incomplete. At worse, it simply does not exist.**
- **Always have to make assumptions; always have to extrapolate from:**
  - **Existing time series;**
  - **Lessons from similar projects elsewhere;**
  - **Advice of technical experts.**

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Step 3: Quantify impacts

- **This is perhaps the most important and most common failure in CBA.**

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Step 3: Quantify impacts

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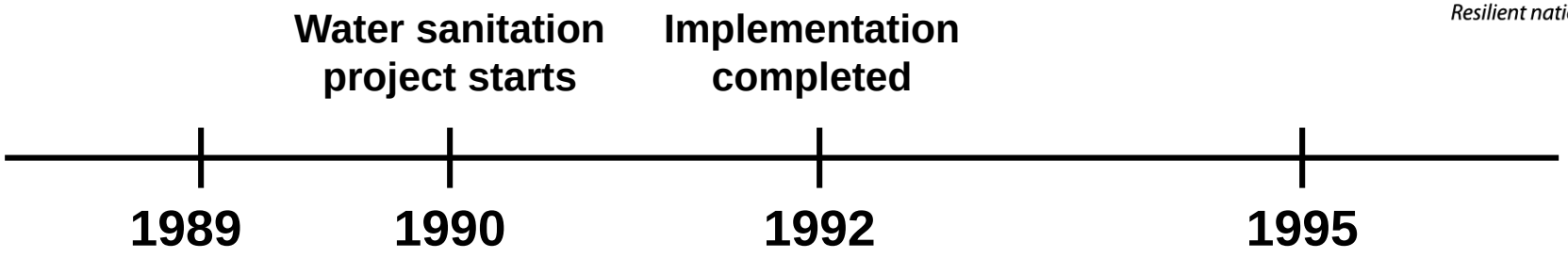
Consider this example:



- Suppose that in years prior to 1990, there were between 50 and 75 cases of gastro-intestinal diseases per month in a district of a large city in Ghana.
- As a result, in 1990 a water sanitation project was initiated and fully implemented by 1992.
- Over the period 1993 to 1995, there are between 100 and 125 cases of gastro-intestinal diseases per month in the same district.

Conclusion: Therefore the project was a failure.
Is this a correct conclusion? If not, why not?

Step 3: Quantify impacts

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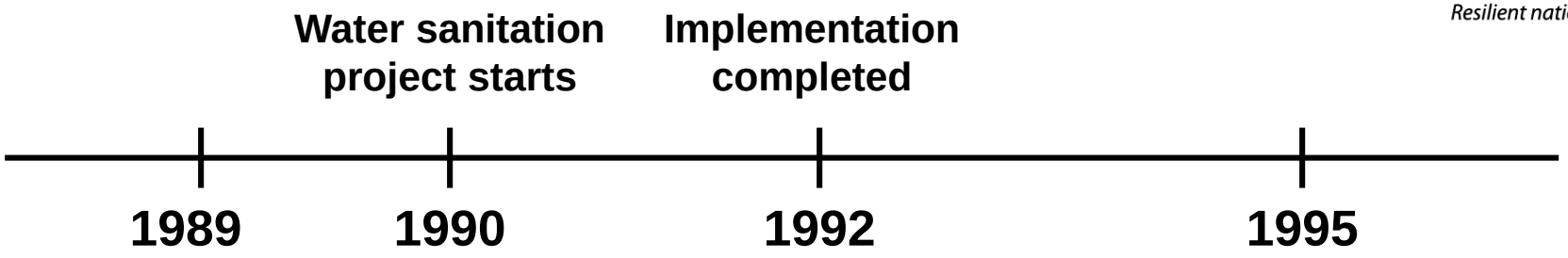
Consider this example:



- Suppose that in years prior to 1990, there were between 50 and 75 cases of gastro-intestinal diseases per month in a district of a large city in Ghana.
- As a result, in 1990 a water sanitation project was initiated and fully implemented by 1992.
- Over the period 1993 to 1995, there are between 10 and 25 cases of gastro-intestinal diseases per month in the same district.

Conclusion: Therefore the project was a success.
Is this a correct conclusion? If not, why not?

Step 3: Quantify impacts

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Suppose the following (hypothetical) situation:

Suppose that fisheries in Ghana have been in decline in the last many years (perhaps as a result of over-fishing).

Suppose that in Ghana, climate change is projected to have an adverse effect on fisheries (perhaps as a result of increase in water temperature or ocean acidification).

GROUP DISCUSSION

How would you assess the impact of climate change on fisheries in Ghana?

Step 3: Quantify impacts

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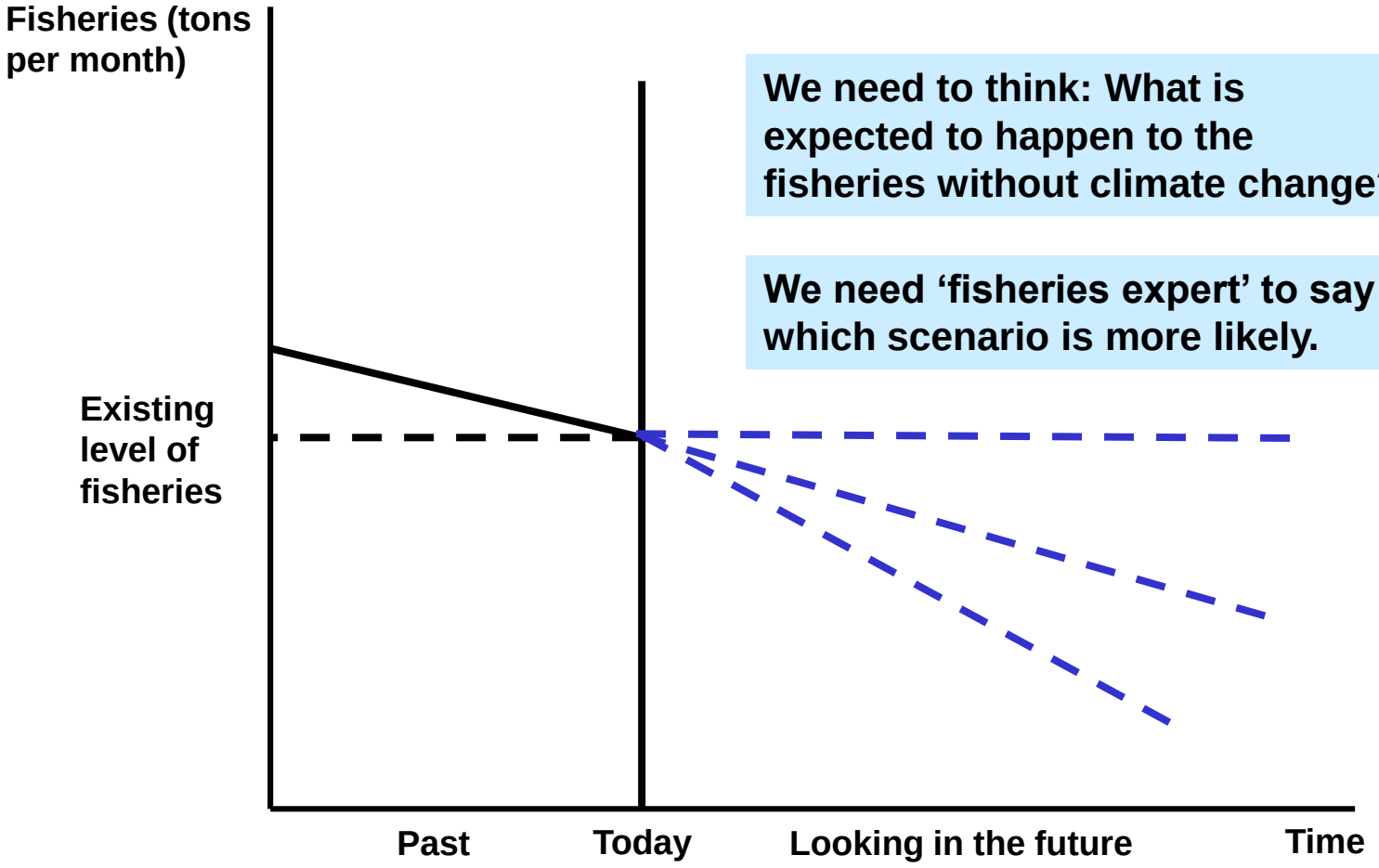

We need to think: What is expected to happen to the fisheries without climate change?

We need 'fisheries expert' to say which scenario is more likely.

Step 3: Quantify impacts

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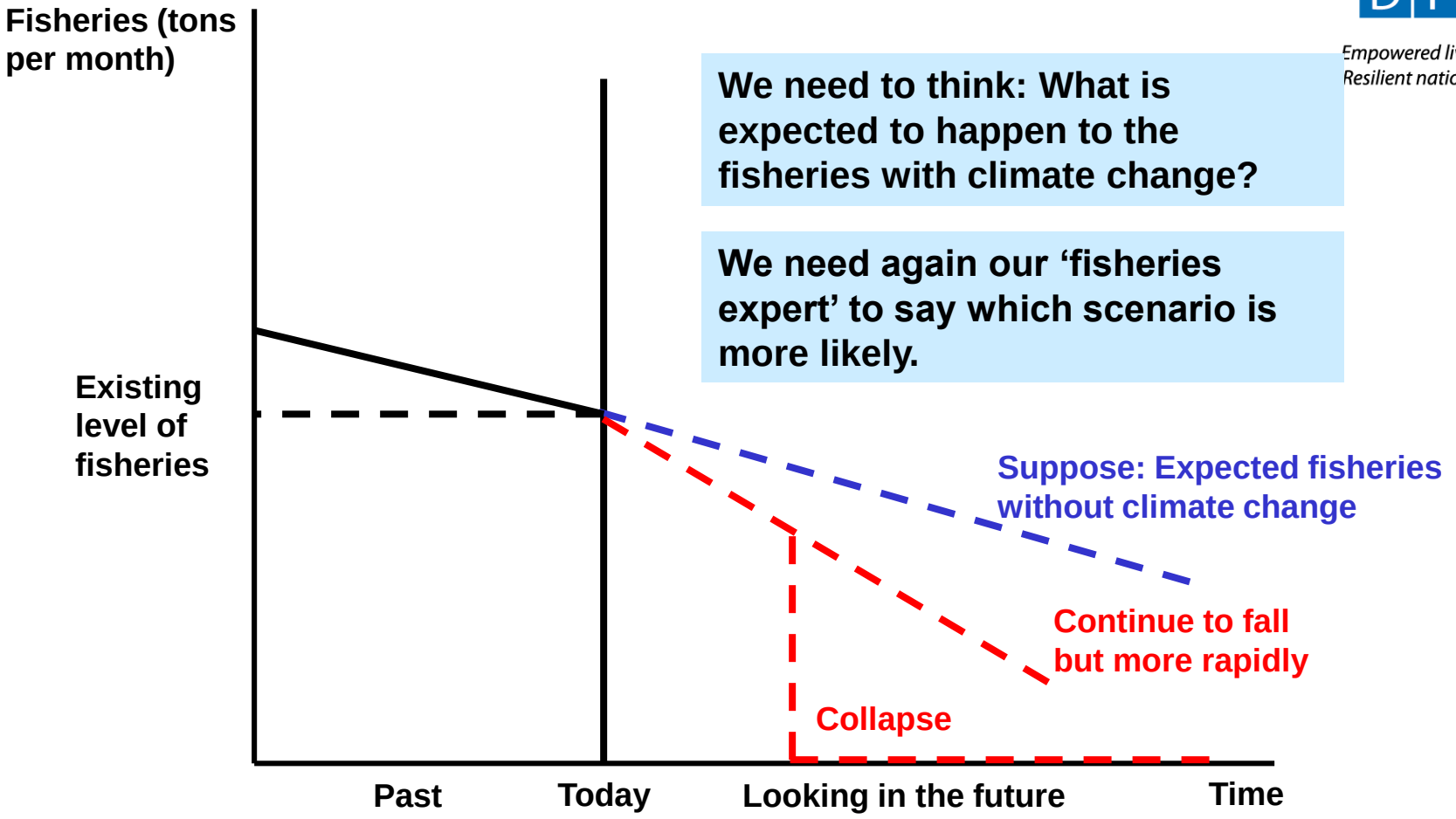
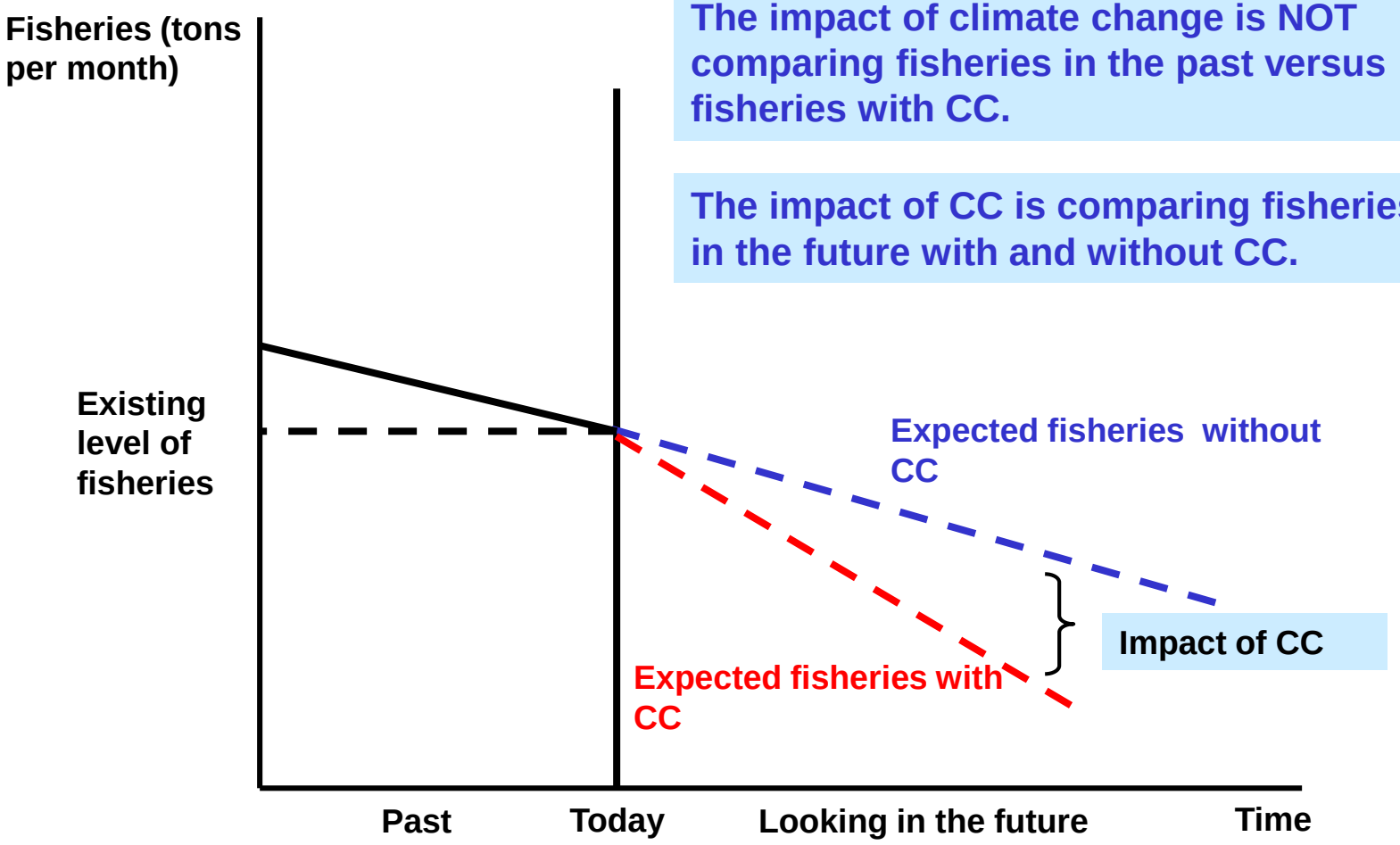


We need to think: What is expected to happen to the fisheries with climate change?

We need again our 'fisheries expert' to say which scenario is more likely.

Step 3: Quantify impacts



The impact of climate change is NOT comparing fisheries in the past versus fisheries with CC.

The impact of CC is comparing fisheries in the future with and without CC.

Step 3: Quantify impacts

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Now suppose the following (hypothetical) situation:

There is an adaptation measure which could reduce (partly or totally) the adverse impact of climate change on fisheries.

GROUP DISCUSSION

How would one assess the positive impact of this adaptation measure on fisheries?

Step 3: Quantify impacts

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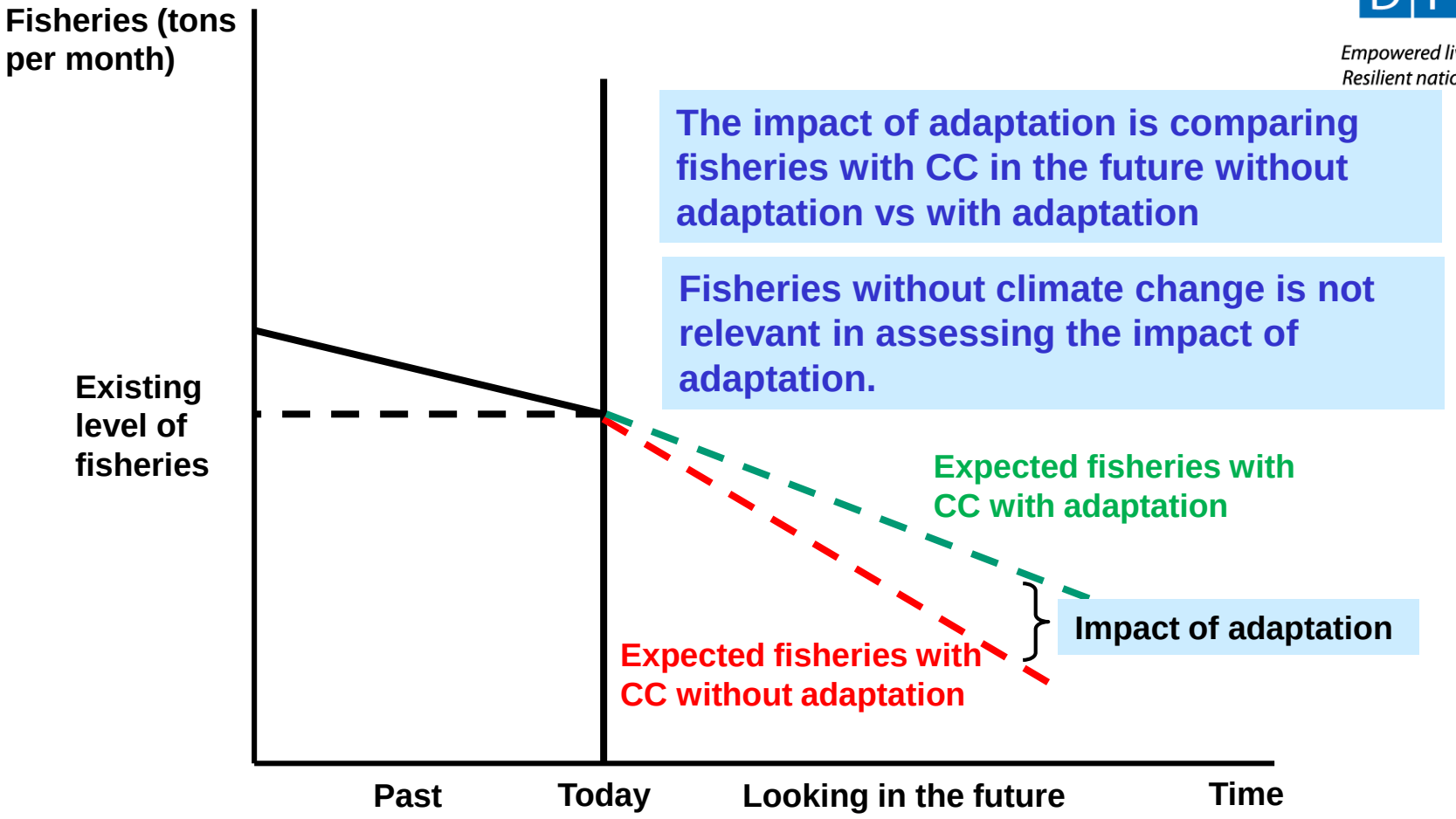

Step 3: Quantify impacts

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We must always ask: What would happen if the project did not take place. We must compare how the situation will be "with the project" and how it is expected to be "without the project".

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