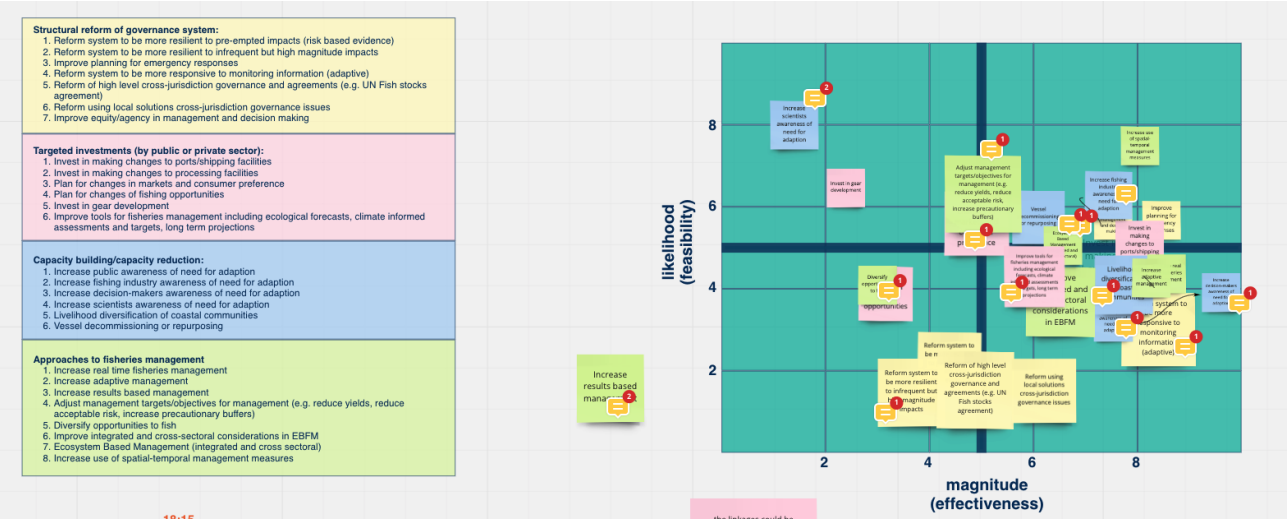
ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

You are receiving this survey as part of the ICES workshop on pathways to climate-aware advice (WKCLIMAD). This workshop is exploring how the short-, medium-, and long-term impacts of climate change on aquaculture, fisheries, and ecosystems can be accounted for in ICES advice. **This is the FISHERIES Part 2 of the second Delphi Survey to rate the likelihood (= feasibility) and magantude (= effectiveness) of ADAPTATION measures to 1) add resliiancy to the climate-threatened seafood industy and/or 2) take advantage of new oppertunities presented by climate, or otherwise allow society and the ecosystem to prosper.** NOTE: This survey does not address ways to mitigate or remove carbon. - that is addressed in another survey. This topic was explored during the third day of the virtual workshop on October 18th, 2021. You may return to the MIRO board with the link provided.

You may recall your work looked something like this:



ICES has identified you or your organization, or you have nominated yourself as a stakeholder or knowledge holder in the fields of climate, fisheries, or aquaculture.

Information gathered via this questionnaire is subject to the ICES data privacy statement.

The information provided by you will be used to assist ICES to outline actionable strategies and approaches that can be taken to promote resiliency in fisheries, aquaculture, and ecosystems. This information will be published online and made available to the public. Data will be aggregated so you will not be identifiable; in the event direct quotes are used, these will be identified by an alias/pseudonym.

You may withdraw from the research at any time, without the need to explain, without penalty, and your personal data will be immediately deleted. Anonymized research data will be archived by ICES. All personal data will be deleted 5 years after the WKCLIMAD report is published.

By responding to this survey you acknowledge and consent to your personal data being used as described above.

We expect this survey to take 2 hours to complete. You may save the form and come back to it later using the SAVE button at the bottom. An email will be sent to you with a link that you can use to work on it later.

Email

example@example.com

Name

First Name

Last Name

Adaptation Measures

Aquaculture and fisheries are captured on different forms. These measures were harvested from the MIRO board for the second day of the WKCLIMAD workshop

harvested from the MIRO board for the second day of the WKCLIMAD workshop and rankings were added based on the discussions on the third day. Note to equate our terms with those used by IPCC and the restoration literature think magnitude = effectiveness and likelihood = feasibility. In this survey we are asking you what you think the most likely (feasible) and effective (magnitude) management measures are to allow the fisheries and aquaculture industries and/or the underlying aquatic ecosystems to flourish in a high carbon dioxide world. Note: You do not need to agree with the ratings provided from the discussions. They are included for your consideration. Using your expert judgement, please rate for each management measure the likelihood/feasibility (1 -none to 10 -extremely likely) that it can be applied and magnitude/effectiveness (from 1 - none to 10 -extreme) of impact it would have, separately. Please also indicate the timeframe that each management measure is either likely to occur, or will have its maximum impact. Also indicate in the confidence column your confidence in your own rating. Further information on each impact can be found on the MIRO board linked above. There are pair sheets for likelihood/feasibility and magnitude/effectiveness for each management measure. The timeframes are short (2021-2040), medium (2041-2060) and long term (2061-2100). NOTE: you must rate all mitigation measures. If the measure is out of your area of expertise then indicate very low confidence in your answer for those impacts (we may remove those rated very low from the ranking). There is space for further comment at the end of the survey and at the end of each row. You may save the form and come back to it later using the SAVE button at the bottom. An email will be sent to you with a link that you can use to work on the rest later.

Fisheries: Structural reform of governance system:

For structural reform of governance systems: Please rate on a scale from 1 (unlikely) to 10 (highly likely), the LIKELIHOOD/FEASIBILITY that each of the mitigation approaches listed in the first column could occur. In thinking about likelihood consider cost, state of technical advancement, political will and ease of regulatory/social change. Please indicate the time period that this mitigation measure could take hold and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	Othe Thougl
Improve planning for	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯			

emergency responses 7.5													
Reform system to be more responsive to monitoring information (adaptive) 6.0													
Reform system to be more resilient to pre-empted impacts (risk based evidence) 5.6													
Improve equity/agency in management and decision making 5.1													
Reform using local solutions cross-jurisdiction governance issues 6.0													
Reform system to be more resilient to infrequent but high magnitude impacts 4.3													
Reform of high level cross-jurisdiction governance and agreements (e.g. UN Fish stocks agreement) 4.0													

For structural reform of governance system: Please rate on a scale from 1 (no impact) to 10 (high impact), the MAGNITUDE/EFFECTIVENESS that each of the mitigation approaches listed in the first column could have on adapting to climate

mitigation approaches listed in the first column could have on adapting to climate change. In thinking about magnitude consider the resiliency the measure could add to the system and/or the amount of seafood the measure could provide. Please

indicate the time period that this mitigation measure would need to make a significant impact and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	Othe Thougl
Reform system to be more responsive to monitoring information (adaptive) 6.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Reform system to be more resilient to pre-empted impacts (risk based evidence) 6.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Improve equity/agency in management and decision making 7.0	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Improve planning for emergency responses 7.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Reform using local solutions cross-jurisdiction governance issues 7.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Reform system to be more resilient to infrequent but high magnitude impacts 6.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Reform of high level cross-jurisdiction	○	○	○	○	○	○	○	○	○	○	⌄	⌄	

governance and agreements (e.g. UN Fish stocks agreement) 6.8													

Fisheries: Targeted investments (by public or private sector)

Targeted investments (by public or private sector) in fisheries: Please rate on a scale from 1 (unlikely) to 10 (highly likely), the LIKELIHOOD/FEASIBILITY that each of the mitigation approaches listed in the first column could occur. In thinking about likelihood consider cost, state of technical advancement, political will and ease of regulatory/social change. Please indicate the time period that this mitigation measure could take hold and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	Ot Tho
Improve tools for fisheries management including ecological forecasts, climate informed assessments and targets, long term projections 7.2	○	○	○	○	○	○	○	○	○	○			
Plan for changes of fishing opportunities 6.6	○	○	○	○	○	○	○	○	○	○			
Invest in making changes to ports/shipping facilities 6.6	○	○	○	○	○	○	○	○	○	○			
Invest in gear development 7.4	○	○	○	○	○	○	○	○	○	○			
Plan for changes in markets and	○	○	○	○	○	○	○	○	○	○			

consumer preference 5.7													
Invest in making changes to processing facilities 6.9	○	○	○	○	○	○	○	○	○	○			

Targeted investments (by public or private sector) in fisheries: Please rate on a scale from 1 (no impact) to 10 (high impact), the MAGNITUDE/EFFECTIVENESS that each of the mitigation approaches listed in the first column could have on adapting to climate change. In thinking about magnitude consider the resiliency the measure could add to the system and/or the amount of seafood the measure could provide. Please indicate the time period that this mitigation measure would need to make a significant impact and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	Othe Thoug
Invest in making changes to ports/shipping facilities 7.0	○	○	○	○	○	○	○	○	○	○			
Invest in making changes to processing facilities 5.3	○	○	○	○	○	○	○	○	○	○			
Improve tools for fisheries management including ecological forecasts, climate informed assessments and targets, long term projections 7.3	○	○	○	○	○	○	○	○	○	○			
Plan for changes of fishing opportunities 6.1	○	○	○	○	○	○	○	○	○	○			
Plan for changes in markets and consumer preference 6.0	○	○	○	○	○	○	○	○	○	○			

preference 6.0													
Invest in gear development 3.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	

Fisheries: Capacity building/capacity reduction

Capacity building/capacity reduction in fisheries: Please rate on a scale from 1 (unlikely) to 10 (highly likely), the LIKELIHOOD/FEASIBILITY that each of the mitigation approaches listed in the first column could occur. In thinking about likelihood consider cost, state of technical advancement, political will and ease of regulatory/social change. Please indicate the time period that this mitigation measure could take hold and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	O Tho
Increase public awareness of need for adaption 6.9	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Vessel decommissioning or repurposing 6.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase scientists awareness of need for adaption 7.9	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Livelihood diversification of coastal communities 4.6	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase fishing industry awareness of need for adaption 6.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase decision-makers awareness of need for adaption 6.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	

Capacity building/capacity reduction in fisheries: Please rate on a scale from 1 (no impact) to 10 (high impact), the MAGNITUDE/EFFECTIVENESS that each of the mitigation approaches listed in the first column could have on adapting to climate change. In thinking about magnitude consider the resiliency the measure could add to the system and/or the amount of seafood the measure could provide. Please indicate the time period that this mitigation measure would need to make a significant impact and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	O Tho
Livelihood diversification of coastal communities 6.8	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Vessel decommissioning or repurposing 3.8	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase public awareness of need for adaption 7.6	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase fishing industry awareness of need for adaption 6.9	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase scientists awareness of need for adaption 3.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase decision-makers awareness of need for adaption 6.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	

Fisheries: Approaches to fisheries management

Approaches to fisheries management: Please rate on a scale from 1 (unlikely) to 10 (highly likely), the LIKELIHOOD/FEASIBILITY that each of the mitigation approaches

listed in the first column could occur. In thinking about likelihood consider cost, state of technical advancement, political will and ease of regulatory or social

change. Please indicate the time period that this mitigation measure could take hold and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	C Th
Increase real time fisheries management 5.9	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Improve integrated and cross-sectoral considerations in EBFM 4.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase use of spatial-temporal management measures 7.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase adaptive management 6.4	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Diversify opportunities to fish 5.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Adjust management targets/objectives for management (e.g. reduce yields, reduce acceptable risk, increase precautionary buffers) 6.3	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Ecosystem Based Management (integrated and cross sectoral) 5.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase results based management 4.6	○	○	○	○	○	○	○	○	○	○	⌄	⌄	

Approaches to fisheries management: Please rate on a scale from 1 (no impact) to 10 (high impact), the MAGNITUDE/EFFECTIVENESS that each of the mitigation

10 (high impact), the MAGNITUDE/EFFECTIVENESS that each of the mitigation approaches listed in the first column could have on adapting to climate change. In thinking about magnitude consider the resiliency the measure could add to the system and/or the amount of seafood the measure could provide. Please indicate the time period that this mitigation measure would need to make a significant impact and indicate your confidence in the estimate. *

	1	2	3	4	5	6	7	8	9	10	Time Frame	Confidence	C Th
Adjust management targets/objectives for management (e.g. reduce yields, reduce acceptable risk, increase precautionary buffers) 6.4	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase real time fisheries management 8.2	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase results based management 7.4	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Diversify opportunities to fish 5.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Improve integrated and cross-sectoral considerations in EBFM 6.8	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase adaptive management 7.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Ecosystem Based Management (integrated and cross sectoral) 6.9	○	○	○	○	○	○	○	○	○	○	⌄	⌄	
Increase use of spatial-temporal management measures 7.7	○	○	○	○	○	○	○	○	○	○	⌄	⌄	

Please add any management actions to mitigate climate change we might have missed or make any comments below:

missed or make any comments below:

Type here...

You may save the form and come back to it later using the SAVE button at the bottom. An email will be sent to you with a link that you can use to work on the rest later.