

Concept Note: Arctic Parametric Microinsurance

Team

Team Members, e-mails, Universities, Programmes

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Concept Note (Proposed Idea)

Describe your idea and the problem / issue(s) it addresses

In the Arctic Circle, the income of many of the [four million inhabitants](#) is heavily dependent on the extent of sea ice. Especially for indigenous people living outside urban centres, the sea ice is an essential ground for [hunting, fishing and commuting](#). This dependence makes these people vulnerable to changes in their physical environment. The [observed and projected decline](#) in sea ice extent has a direct [negative impact](#) on accessible hunting grounds and transportation routes. Unlike people living in more developed areas, marginalised people in the Arctic cannot use financial products such as insurance to [transfer part of their risk](#). This protection gap can be partly explained by their limited financial resources and [lack of trust](#) in financial institutions. However, equally problematic is the current lack of suitable financial products that could help indigenous communities to adapt effectively to the decrease in sea ice extent.

We want to address this problem by developing a proposal for a parametric microinsurance for sea ice dependent Arctic residents. The suggested [parametric \(or index based\) insurance](#) covers the probability of a predefined event happening instead of indemnifying actual loss incurred. More specifically, the vulnerable Arctic residents receive a predefined payment as compensation for loss of income if the sea ice in their region falls below a predefined threshold ([extent of sea ice](#) measured in millions of km², see [Figure 1](#)). Using publicly available data on sea ice from the [National Snow & Ice Data Center](#), insights from the [Arctic Social Indicators](#) and resources from the [Arctic Monitoring & Assessment Programme](#), we are currently working on a computational model to assess the risk exposure of the affected individuals and potential pricing mechanisms. Taking the varying vulnerability of different regions into account, our model will provide a transparent basis for a viable financial instrument to transfer risk.

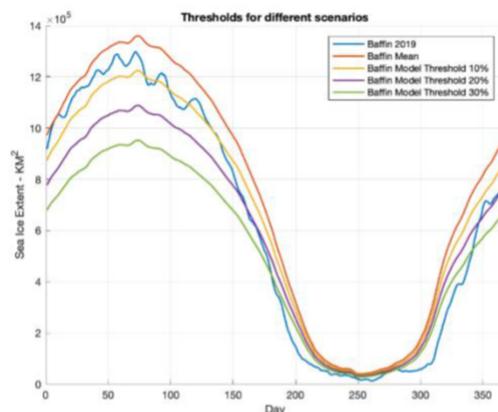


Figure 1: Daily sea ice extent over a one-year period in the Baffin Bay region (NSIDC, 2019). The different thresholds (10%, 20% and 30%) illustrate the minimum level of sea ice extent that would need to be undercut to release the trigger (i.e. payout is made).

To promote understanding of the proposed financial product and to demonstrate the added value to vulnerable Arctic residents, we require a comprehensive advisory concept for the implementation of this parametric microinsurance solution. Before the project can be realized, the customer needs and the optimal process flow need to be identified. To ensure effective product development, cooperation with existing networks of local communities, local governments and NGOs is essential. This collaboration should be used to realize effective [adaptation mechanisms](#) leading to greater resilience to the impacts of climate change.

Describe the key stakeholders involved, which stakeholder provides which services to another, and the flow of funds (e.g., investment amounts, project revenues, customer savings, etc.)
If easier, use a flow diagram to explain.

As visualized in *Figure 2*, the success of the parametric microinsurance depends on a framework of different stakeholders. The involvement of our target segment, sea ice dependent Arctic residents, is particularly relevant to our value proposition. A stakeholder essential to the proposed solution is the distribution partner (i.e. intermediary), who could be a local fuel/food distributor. Such intermediaries would play a key role in building a system of trust and ensuring that financial flows run smoothly. They must therefore be carefully selected, and a strong relationship of trust and cooperation established. Such relationships are reinforced through frequent contact with potential customers and enable distributors to act as intermediaries between the communities and the more general economic services. The intermediary can also be used as a transparency center, where current trends in sea ice extent are reported. This could help to ensure that customers are always informed about the extent of sea ice and can educate themselves. Moreover to manage the risk and correctly price exposure to low sea ice extent, the involvement of an insurer is necessary. We suggest that a private (re)insurance company act as a risk carrier. However, the (re)insurer should be supported by public insurance systems to cover potential deficits (i.e. subsidize microinsurance scheme). While public authorities are often involved in promoting sustainable development, private insurers may be interested in such concepts in order to [explore new sources of profit](#), test new products or strengthen their social responsibility as a company. Lastly, we acknowledge that the product only works with a continuous offer of adaptation advice. These advisory services are provided by selected local institutions and NGOs.

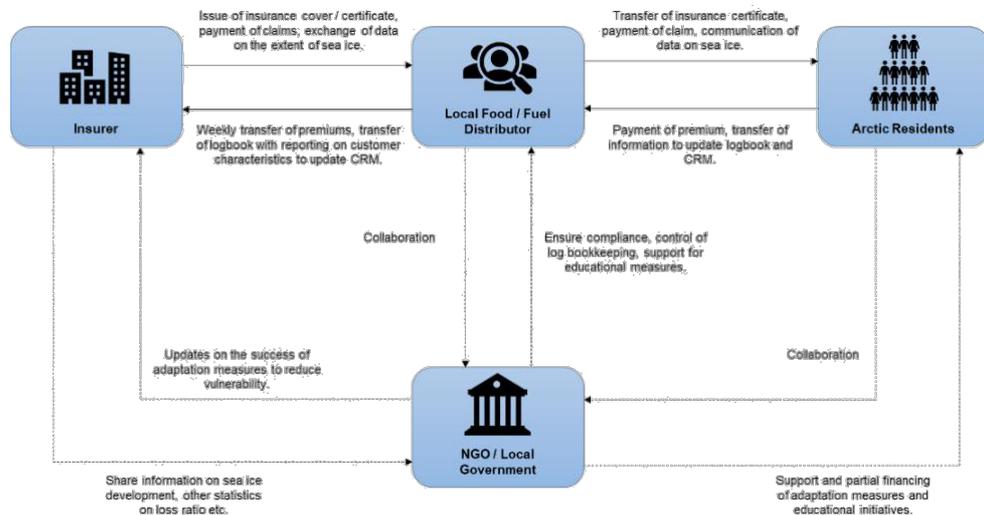


Figure 2: Flow diagram of key stakeholder involvement

As illustrated in *Figure 3*, the proposed microinsurance product is integrated into the purchase of food or fuel from a local distributor. Other microinsurance projects have shown that such an approach can facilitate the transaction process and simplify financial flows. For each purchase of food or fuel, the customer pays a mandatory premium to cover part of the required risk premium (willingness to pay is identified in the product development phase). The distributor records the customer in a logbook (ideally digitally) and transfers the surcharge received to the insurer on a weekly basis. The intermediary receives a commission for this service. Furthermore, the commercialization of this solution offers a differentiating feature, which can be a further advantage in a competitive distribution system. On a weekly basis, the intermediary forwards the new entries in the logbook to the insurer so that the CRM can be updated, and the insurance model can be priced appropriately.

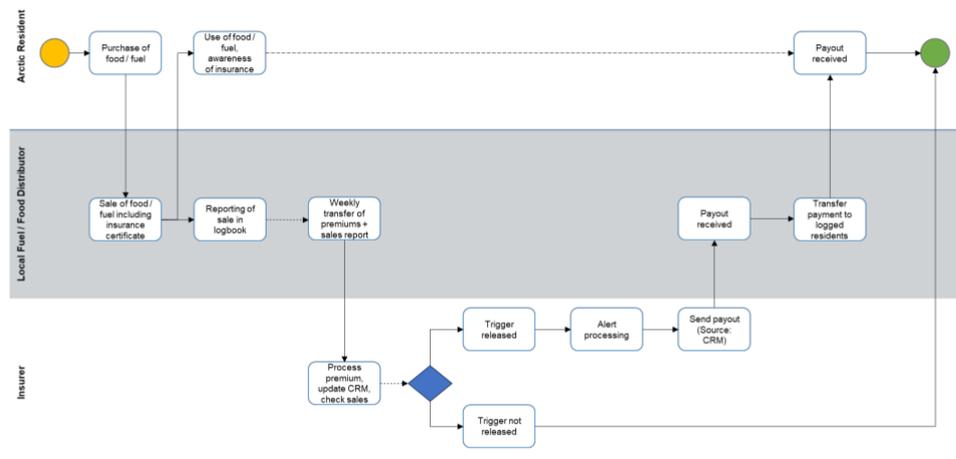


Figure 3: Flow diagram of distribution process

As soon as the sea ice extent falls below a predefined threshold, the triggering event is realized and a predefined payment is made by the insurer to the distributor. The payment is transferred at the next customer contact point and the customer receives the compensation.

If possible and appropriate, describe or use a simple illustrative calculation to demonstrate the feasibility / attractiveness of the idea.

Market Size / Pricing	
Total number of sea ice dependent arctic residents	400,000 Grid-Arendal (n.d.) and AMAP (2017)
Projected 'parametric microinsurance' penetration rate	30% Assumption, to be verified in product development phase
Number of customers covered by 'parametric microinsurance'	120,000
Average annual revenues depending on sea ice to be protected per customer	1,800.00 NSIDC (n.d.) and AMAP (2017), to be verified in product development phase
Average annual spendings on food and fuel at local distributor per customer	800.00 Assumption, to be verified in product development phase
Insurance premium (surcharge) per USD spent on food and fuel at local distributor	17% Assumption, to be verified in product development phase
Average annual insurance premium payments per customer	136.00
Total annual premium income	16,320,000
Scenario 1 (10% threshold)	
Probability of undercutting minimum level of sea ice extent (threshold)	23% NSIDC (2019), sea ice extent of Baffin region used as a proxy
Expected annual payouts for 'parametric microinsurance'	49,680,000 Mitigation through insurance portfolio diversification, to be verified in product development phase
Expected shortfall / surplus to be covered (i.e. subsidized)	(33,360,000)
Scenario 2 (20% threshold)	
Probability of undercutting minimum level of sea ice extent (threshold)	11% NSIDC (2019), sea ice extent of Baffin region used as a proxy
Expected annual payouts for 'parametric microinsurance'	23,760,000 Mitigation through insurance portfolio diversification, to be verified in product development phase
Expected shortfall / surplus to be covered (i.e. subsidized)	(7,440,000)
Scenario 3 (30% threshold)	
Probability of undercutting minimum level of sea ice extent (threshold)	7% NSIDC (2019), sea ice extent of Baffin region used as a proxy
Expected annual payouts for 'parametric microinsurance'	15,120,000 Mitigation through insurance portfolio diversification, to be verified in product development phase
Expected shortfall / surplus to be covered (i.e. subsidized)	1,200,000

Note: The payment will be made no more than once a year.

What is the climate impact of your solution? Who does it target?

The proposed solution offers an innovative climate adaptation strategy. Historically, people living in the Arctic Circle have shown their [high adaptive capacity](#) to changing environments. The use of specially developed financial products can be the next step to reduce the vulnerability of these communities in the long term.

The parametric microinsurance we propose is primarily aimed at [Arctic residents](#) who have a high proportion of income dependent on sea ice extent. This scheme is designed to assist communities with a minimal degree of intrusion, and negligible environmental impact. We anticipate the scheme to have virtually no climate impacts resulting from end-user activities, and foresee the transport emissions required to initially set up the scheme to be the only significant environmental impacts associated with the project.

How is it
scalable /
replacible?

The proposed solution is scalable, as the framework can be used for different climate impacts in different regions. However, it should be noted that the project is very likely to require public sector support (=subsidies). It is also important to diversify the insurance model as much as possible so that the risk of accumulation can be minimized. This can be done, for example, by distributing the insurance model in different regions in the Arctic Circle. Accepting that the target group of the microinsurance solution of 'sea ice dependent Arctic residents' is relatively small, we have found other areas of interest, which could be approached with a similar financial product:

- Application of parametric microinsurance model to tackle high concentrations of micro- and macroplastics in the ocean. Based on a dataset of the [CPR Survey](#) and a study from [Ostle et al. \(2019\)](#)
- Application of parametric microinsurance model to tackle ocean acidification (decreasing pH value) in different geographical regions and seasons. Based on a dataset of the [Hawaii Ocean Time Series \(HOT\)](#).
- Application of a parametric microinsurance model to help [Kenyan livestock farmers](#) adapt to heat waves and drought
- Use of developed parametric insurance model to hedge uncertainty for shipping lines when planning transits of the [Northwest Passage](#) (dataset yet to be established)

References

- AMAP. (2017). *Adaptation actions for a changing Arctic*. Retrieved 01 10, 2020, from Arctic Monitoring and Assessment Programme: <https://www.amap.no/documents/download/2993/inline>
- Arctic Council. (2017). *Telecommunications Infrastructure in the Arctic. A circumpolar assessment*. Retrieved 01 10, 2020, from <https://oaarchive.arctic-council.org/bitstream/handle/11374/1924/2017-04-28-ACSTelecomsREPORTWEB-2.pdf?sequence=1>
- Buckland, J., McKay, D., & Reimer, N. (2016). *Financial Inclusion and Manitoba Indigenous Peoples*. Retrieved 01 10, 2020, from Canadian Centre for Policy Alternatives Manitoba: https://seedwinnipeg.ca/files/Financial_Inclusion.pdf
- Ford, J., Gough, W., Laidler, G., MacDonald, J., Irngaut, C., & Qrunnut, K. (2009). Sea ice, climate change, and community vulnerability in northern Foxe Basin, Canada. *Climate Research*, 38, 137-154.
- GRID-Arendal. (n.d.). *Indigenous Peoples of the Arctic*. Retrieved 01 10, 2020, from <https://grid-arendal.maps.arcgis.com/apps/Cascade/index.html?appid=2228ac6bf45a4cebafc1c3002ffef0c4>
- IFAD. (2012). *Microinsurance product development for microfinance providers*. Retrieved 01 03, 2020, from International Fund for Agricultural Development: <https://www.ifad.org/documents/38714170/39144386/Microinsurance+Product+Development+for+Microfinance+Providers.pdf/bf81e93a-971d-41c2-9913-a87212f77dc6>
- IPCC. (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press. Retrieved from https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-PartB_FINAL.pdf
- MicroInsurance Company. (2018). *Parametric Insurance*. Retrieved 01 07, 2020, from <http://blog.microinsurance.com/post/parametric-insurance>
- Microinsurance Network. (2013). *Commercial Insurers in Microinsurance: Recent Trends*. Retrieved 01 10, 2020, from https://microinsurancenetwerk.org/sites/default/files/files/Commercial_Insurers_in_Microinsurance_Survey_2013b-1.pdf
- Nordic Council of Ministers. (2014). *Arctic Social Indicators. ASI II: Implementation*. Retrieved 01 10, 2020, from <http://norden.diva-portal.org/smash/get/diva2:789051/FULLTEXT02.pdf>
- NSIDC. (2019). *State of the Cryosphere: Sea ice*. Retrieved 01 10, 2020, from National Snow & Ice Data Center: https://nsidc.org/cryosphere/sotc/sea_ice.html
- NSIDC. (2020). *Sea Ice Data and Analysis Tools*. Retrieved 01 10, 2020, from National Snow & Ice Data Center: <https://nsidc.org/arcticseaicenews/sea-ice-tools/>
- NSIDC. (n.d.). *All About Sea Ice*. Retrieved 01 09, 2020, from National Snow & Ice Data Center: https://nsidc.org/cryosphere/seaice/environment/indigenous_impacts.html
- NSIDC. (n.d.). *Arctic People*. Retrieved 01 10, 2020, from National Snow & Ice Data Center: <https://nsidc.org/cryosphere/arctic-meteorology/arctic-people.html>
- Richardson, K., Steffen, W., & Liverman, D. (2011). *Climate Change: Global Risks, Challenges and Decisions*. Cambridge: Cambridge University Press. Retrieved from https://www.cambridge-org.iclibezp1.cc.ic.ac.uk/core/services/aop-cambridge-core/content/view/8C13C2786A36D3D84F7432A996C2EBED/9780511973444c14_p388-412_CBO.pdf/adapting_to_the_unavoidable.pdf