

19. July 2022

1st Workshop on Tourism Monitoring in Antarctica - Development of a concept for the analysis of the impacts of tourism on the assets to be protected in the Antarctic

28 May 2022 (Berlin and online), 9:00-16:30 CEST

Summary

The first workshop on tourism monitoring was held to build the basis for the development of a concept for the analysis of the impacts of tourism on the assets to be protected in the Antarctic. Results from a literature review on the impacts of tourism as well as the first approaches for a monitoring system were presented and discussed in three parallel working groups. This document gives an overview of the remarks and ideas on the discussion questions.

We would like to thank all participants of the workshop for the lively discussions and ideas you shared, and we look forward to continuing the work on the monitoring concept together!

Background

In the last decades, Antarctic tourism has rapidly increased in quantity and this upward trend is expected to continue. Furthermore, new tourism activities are emerging with the diversification of Antarctic tourism. The Antarctic ecosystem is highly sensitive due to the isolation of the Antarctic continent and the extreme conditions for the evolution of flora and fauna. Despite the potential of human activities to affect and damage the sensitive ecosystem or individual components, the current knowledge is limited and widely restricted to impacts on some components of the ecosystem. Little is known about cumulative or indirect impacts and the relationship between short-term and long-term impacts.

A solid knowledge base on the impacts of tourism and the effectiveness of different management measures is the prerequisite for the proactive management of tourism in the Antarctic. The German Environment Agency (UBA) therefore commissioned a research project with funding from the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection to develop a systematic and comprehensive long-term monitoring concept for tourist sites in the Antarctic. The results of the monitoring should serve to prevent or minimize potential adverse impacts of tourism and advance the protection of the Antarctic environment.

Key messages from the presentations and Q&A sessions

Presentation 1: An overview of Antarctic Tourism by IAATO (Amanda Lynnes. IAATO) (see <https://tourism-monitoring-antarctica1.fresh-thoughts.eu/materials/> for details)

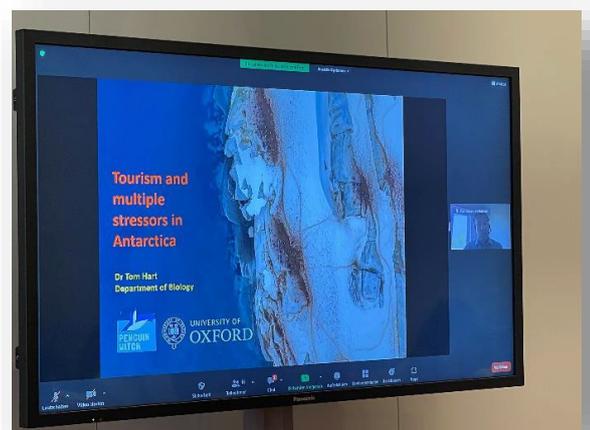
- Presentation of the organizational structures of the IAATO and quantitative and qualitative description of Antarctic tourism.
- Efforts to ensure safe and environmentally responsible tourism through management tools: live ship scheduler, mandatory assessments, speed limits, mandatory observations, guidelines and codes of conduct.
- Needs and opportunities for monitoring tourism in Antarctica:



- Build on existing foundations: ongoing data collection for decades (e.g. University of Oxford Penguin Watch);
- Identify the gaps;
- Harness the community (use the potential of field staff and tourists → citizen science projects);
- Collaboration and communication of stakeholders are key;
- Untangling the impacts of tourism is tricky (due to large-scale changes (e.g. climate change) and other local human activities in Antarctica and complicated by inter-annual variabilities) → be aware of a bias toward tourism and
- use chances of tourism: create ambassadors for the protection of Antarctica.

Presentation 2: Tourism and multiple stressors in Antarctica (Dr Tom Hart, University of Oxford, Department of Zoology) (see <https://tourism-monitoring-antarctica1.fresh-thoughts.eu/materials/> for details)

- Multiple anthropogenic threats:
 - Whaling (populations have not fully recovered yet);
 - Climate change;
 - Increase of fishery for krill;
 - Decline of sea ice and
 - tourism.
- Focus on impacts of tourism on penguins (e.g. population size, breeding): inconsistent conclusions (local circumstances matter?).
- No significant adverse effects of visitation on local penguin populations at current levels and with current activities.



- Little is known about the impacts of human disturbances on other species (e.g. seals, whales), or penguins while being in the water.
- “Tourism” does not include national program visits → a differentiation between science and non-science activities would be preferable.
- Impacts of climate change and fishing should receive greater attention; future changes may be considerably driven by the presence or absence of sea ice.

Presentation 3: Findings from the Literature review (Thomas Dworak, Fresh Thoughts Consulting) (see: <https://tourism-monitoring-antarctica1.fresh-thoughts.eu/materials/> for details)

Main findings:

Antarctic tourism:

- Rapid increase in visitor numbers, the upward trend is expected to continue.
- Diversification of tourism (new activities).
- Knowledge of Antarctic tourism is growing.
- Diverse range of potential impacts.

Management of tourism

- focus on mitigating local impacts of tourist activities (e.g. minimum distance to wildlife, cleaning procedures to avoid alien species spread, ...).

But:

- Current efforts are criticised for relying mainly on management and self-regulation, and lack of legal regulations specifically for tourism.
- Lack of considering large-scale, long-term and cumulative impacts of tourism (e.g. Antarctic tourism contributing to global climate change, consequences of frequent disturbances, impacts from the combination of different human activities).
- The potential ambassador role of tourists is discussed controversially.
- Management strategies: spatial concentration of tourists (as currently pursued) preferable or a more widespread distribution?
- Efforts are inconsistent and uncoordinated according to most authors → the current level of environmental protection is inadequate.

Conclusions and recommendations in the literature

- Revision of site guidelines according to scientific recommendations.
- Improve the supervision of tourists and tour operators.



- Limit the number of visitors and restrict certain tourist activities (based on the sensitivity of the site and the impacts of different tourist activities).

Knowledge gaps

- Impacts are to date rarely quantified.
- Cumulative impacts and the relationship between short-term and long-term impacts are poorly understood.
- Literature focuses on highly visited areas (Antarctic Peninsula) and cruise tourism mainly, gaps in the knowledge about the impacts of less frequently performed tourist activities.
- Lack of a comprehensive understanding of the different components of the environment and their interactions on a larger scale.
- Knowledge about the effectiveness of different management measures is limited.

Main ideas from the working groups

1. Findings from the literature review

Please see the background paper of the workshop for the basis of the discussion, available at https://tourism-monitoring-antarctica1.fresh-thoughts.eu/wp-content/uploads/sites/97/2022/05/Discussion-Paper-Tourism-Monitoring_20220518.pdf

The remarks presented below are grouped along with the discussion questions and represent all three working groups that have been held in parallel.

In the initial phase of the development of the monitoring concept, it is important to bring together stakeholders with different knowledge and background. In the following, we list all remarks and suggestions without further assessment to ensure an open brainstorming.

Question 1: Were all relevant drivers, pressures and environmental impacts identified?

There were no objections to the shown Pressure-Impact-Response diagrams. However, the list of drivers and pressures can still be extended, and some concerns regarding the causality behind the diagrams were shared.

- The scientific literature is a very good source and starting point but instruments such as the EIA (Environmental Impact Assessment) could also be used as this is an extensive database of different activities and it also gives an overview of what is planned for the future. However, information is not easy to access.
- The analysis should not only focus on tourism but also on national program visitation (scientific and logistical staff) as impacts are often similar. Several impacts arise from the interaction of tourism with other drivers (e.g. fisheries). Some impacts can be attributed to tourism and monitored effectively; the trampling of vegetation is a good example.

- The list of drivers contains gaps and is most likely endless. The list of pressures should be cross-checked against the 2019 IAATO Information Paper (IP 145). However, there are activities beyond the control of IAATO such as skiing, climbing or marathons.
- The Driver Pressure Impact causality might not always be as simple as presented. What might seem like a local impact could have an entirely different and not local driver. For example, penguins are complicated, they are countable but it's hard to appoint precise stressors because there are so many factors that can have an influence.
- Disasters, emergencies, and crises should be included as potential pressures, as well as sewage and greywater (which could be non-compliant but also compliant). Furthermore, also novel pollutants (microplastics, pollution from cosmetics) need to be considered and human presence needs to be added to the pressures. We should also look at values (e.g., wilderness values) and how these values might be affected by visitation. Non-native species are important to analyze.
- It is important to consider the social acceptance of different tourist activities, as it might differ from the actual impacts.

Question 2: Which further knowledge gaps need to be considered in developing the monitoring system?

In general, the knowledge gaps depend on the focus of the monitoring. However, the following knowledge gaps have been identified:

Environmental issues:

- Emissions, site-specific changes;
- Plastic, micro-pollutants;
- Emerging issues: diseases, genetics;
- Open sea distribution of animals and ships traffic;
- Eradication of invasive species at visited sites;
- Difficult to disentangle impacts from tourist or station staff.

Geographical issues

- Certain sites are less assessed than others, e.g., the Peninsula has a high focus but the Ross Sea region is hardly looked at.

Socio-economic issues

- Why do people not travel to Antarctica?
- What are the potentials of virtual tourism in Antarctica? What about the payment?
- The role of gateways to Antarctica and gateway attraction.

- Work of scientists against their cultural background (see Kaitiakitanga concept).
- Assessment of the values of tour operators in Antarctica and how that relates to behaviour in the region.
- There is a major knowledge gap concerning the number of people in ships and routes of ships → IAATO is not providing unrestricted access to (raw) data, AIS (Automatic Identification System) data could be helpful (but not free of charge).
- Media impacts on tourism in Antarctica have received little scientific attention.

Question 3: How can knowledge gaps be made explicit and how can they be addressed effectively in the monitoring system?

Possible solutions to make knowledge gaps explicit but also to reduce them are:

- A precautionary approach could reduce risks due to knowledge gaps.
- Involve experts from other areas to have a look at the approach.
- Do a publication on knowledge gaps.
- Operators and scientists together should work on the monitoring approach, so knowledge from both sides is mobilized.
- Build on historic data and improve these timelines (human impacts of the past can be used to predict impacts in the future).

2. Discussion of first ideas on the monitoring concept

Please see the background paper to the workshop for the basis for the discussion, available at https://tourism-monitoring-antarctica1.fresh-thoughts.eu/wp-content/uploads/sites/97/2022/05/Discussion-Paper-Tourism-Monitoring_20220518.pdf.

Question 1: What should be the aim of the monitoring and what should it be able to monitor?

During the workshop, no common approach on what should be monitored was defined yet, but there was a **wide agreement that the monitoring should provide information for management or to take management measures** (e.g. to avoid negative impacts from tourism).

- Need to think about purpose: What negative impacts do we want to limit? And then map backwards and select the indicators we need; possible risk: we look back and might miss out on pro-active measures.
- The main aim of the monitoring should be to see whether tourism has an impact on the environment which is more than minor and transitory. In other parts of the world a lot of the monitoring is focused on particular values (trampling is a good example), management objectives should be taken from a pragmatic approach, what are the baselines, what are we willing to tolerate, where is the red line where we have to take measures? It needs to be decided which of the values are particularly important and how they could be monitored pragmatically.

- The increase in ship traffic and the problem of underwater noise (soundscape) need to be monitored.

In general, **different types and elements of monitoring have been discussed:**

- There is a need to make a distinction between compliance and environmental monitoring.
- Environmental (surveillance) monitoring looks at the system in general and should detect any changes.
- Compliance (operational) monitoring on the contrary takes more preparation and thought process but monitors a specific question (e.g.: Are the site guidelines and management measures sufficient/effective?). It is based on the descriptors, indicators, thresholds, baselines and methods that can be used. These indicators (e.g. disturbance, the introduction of non-native species and destruction of habitat) need to be defined. For creating a baseline, it is important to know the past to understand the present (historic pollution, historic invasive species, e.g. some non-native species were introduced earlier by whalers and are not related to tourism).
- A couple of key indicators should be identified which might be site-specific and/or comparable to different sites e.g. krill, penguins, vegetation, waste, spills, trampling etc.
- Only one type of monitoring for all places is hard to achieve. There should be key elements that are specific for different regions.

There is **an issue of scale related to monitoring:**

- Local, regional, global?
- Site-specific?
- Temporal variability?

It is important to recognise that if there are protective measures in place the detected changes will only show how effective the protective measures are. An agreement was found that the purpose of the monitoring needs to be clearly outlined.

Question 2: Is the DPSIR framework suitable as a basis for developing the monitoring concept? How can the shortcomings of the concept be overcome in practice? Which alternative concepts should be considered?

In general, the DPSIR approach is a feasible approach, among others, as it is well known. However, some methodological shortcomings (e.g. spatial and time scale) exist, which need to be considered in the development of the monitoring concept. Other opinions favoured developing something fit for purpose.

For the development also the following sources should be reviewed:

- The ASPA system might provide additional ideas for monitoring.
- The decision-theory approach should be considered. Especially when multiple stakeholders and multiple values are involved.

- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Ecosystem Monitoring Program (CEMP).

Question 3: How can conceptual challenges related to the monitoring be addressed and considered in the monitoring (e.g. cumulative effects, different local contexts, complex cause-impact relations)?

- One recommendation related to the question above was to start with analysing monitoring projects in place. There might be information at least about the peninsula that can help in the development.
- Further, the development of the monitoring concept should be an incremental process. Monitoring should cover activities and the status of the environment.
- Another issue that needs to be considered is the comparability of data.
- Concerning cumulative impacts, one approach could be to compare frequently visited sites with less frequently visited sites.
- As Antarctica is very sensitive, monitoring needs to ensure that in the end, we do not monitor the impact of the monitoring as such.
- Need to have indicators of the pressures to assess the impacts.

Question 4: Which organisations/institutions should be involved in the monitoring and how?

In regards to the question the following statements have been made:

- Should be within Antarctic Treaty System.
- NCA (National Competent Authority) has to take the lead.
- A proposal with a new subsidiary group under CEP should be created that involves scientists and operators. A strong link with the IAATO and ATS and advisors should be established. This new body as part of CEP, would have competencies for the content and structure of monitoring, but also funding management. The body would have to have coordination mechanisms, like a secretariat.
- Another proposal was to create a consortium of national institutions and operators.
- IAATO can manage and implement the monitoring as it observes the expeditions (but not develop the monitoring).
- SCADM (Standing Committee on Antarctic Data Management) should be involved for their expertise in data management/reporting requirements.
- A platform to share information is needed; ensure open access to information (FAIR data principles) and interoperability of data; consider existing reporting structures (e.g. EIES).
- Competent authorities could/should play an important role.

- Observers could help with the monitoring (e.g. photo monitoring in New Zealand).
- Operators and scientific staff should be involved in the practical monitoring.
- An early career scientist network should be established as young scientists on board learning how to do environmental management could be an asset.

Question 5: Which role could citizen science play in the monitoring?

The issue was not discussed in-depth, but in general, the potential of citizen science is limited for complex questions. However, cruise operators could do a part of monitoring or help with logistics.

If involved citizen science could contribute to a monitoring program, a monitoring system should not be built in a way that it relies upon citizen science. Companies can play an important role in providing qualified staff for citizen science. The majority of the field staff is trained, so they have the background. However, some additional training is needed. Additionally, the technical equipment has advanced on the ships, which could ease the handling of samples: there are more science capture methods, like science labs: this is something that would accommodate for the handling of samples.

The participants referred to some examples of already existing citizen science projects, e.g., the Polar Citizen Science Collective (<https://polarcollective.org/there>). More examples are listed in the chapter on recommended readings and useful links.

Question 6: How can the funding of the monitoring system be secured?

The results as regards to the above questions identified the following **sources of funding**:

- The User: National Antarctic Program (Scientists crews etc., aircraft users etc.).
- Tourism operators (tourists, crew...) could follow the principle of a membership fee and a passenger fee (per day). This approach was discussed as controversial as some research programs might then become quite expensive on the other side it would provide a huge amount of money continuously.
- Fisheries should also pay, which could be an add-on to the fee, the fee currently is for the science making but there could be one for the impact.
- Others: heritage trusts, NGOs, private and state donors.
- Special funds are filled by the contracting parties and managed by the ATS.

Further important aspects related to funding that have been mentioned are:

- Consider that in-situ monitoring is expensive.
- Consider the LTER in the dry valley as it might provide insights into the long-term funding for monitoring.
- The money raised has to be handled with strict criteria for what exactly the money is used (to have the funding secured, it has to be earmarked for monitoring).

- Ensure sustainability of funding to enable long-term monitoring and maintenance of the monitoring.



Recommended readings and useful links

The section below provides references to scientific papers, reports and projects which were recommended to be considered in the development of the monitoring concept.

Scientific papers and reports:

- ▶ CEP Five-year Work Plan 2019:
https://documents.ats.aq/atcm42/ww/atcm42_ww005_e.pdf
- ▶ IAATO Information Paper 110 (Overview of Antarctic Tourism: A Historical Review of Growth, the 2020-21 Season, and Preliminary Estimates for 2021-22):
<https://iaato.org/information-resources/data-statistics/download-iaato-information-papers/>
- ▶ Assessment of the Possible Cumulative Environmental Impacts of Commercial Ship-Based Tourism in the Antarctic Peninsula Area:
<https://www.nsf.gov/pubs/2002/nsf02201/nsf02201.pdf>
- ▶ First evidence of microplastics in Antarctic snow: <https://tc.copernicus.org/articles/16/2127/2022/>
- ▶ IAATO Information Paper 145 (Catalogue of Activities as documented in the Post Visit Reports filed by IAATO Operators): <https://iaato.org/wp-content/uploads/2020/03/IP145-A-Catalogue-of-IAATO-Operator-Activities.pdf>
- ▶ Resilience in polar ecosystems - From drivers to impacts and changes:
<https://www.sciencedirect.com/science/article/pii/S1873965215300116>

- ▶ From frozen continent to tourism hotspot? Five decades of Antarctic tourism development and management, and a glimpse into the future:
<https://www.sciencedirect.com/science/article/abs/pii/S026151771000052X>
- ▶ Negotiating greater Māori participation in Antarctic and Southern Ocean research, policy, and governance:
<https://www.tandfonline.com/doi/epub/10.1080/2154896X.2022.2058222?needAccess=true>
- ▶ Transforming Antarctic management and policy with an Indigenous Māori lens:
<https://www.nature.com/articles/s41559-021-01466-4>
- ▶ Kaitiakitanga, place and the urban restoration agenda:
<https://www.jstor.org/stable/26841824?seq=1>
- ▶ A digital archive of human activity in the McMurdo Dry Valleys, Antarctica:
<https://essd.copernicus.org/articles/12/1117/2020/>
- ▶ Southern Ocean Action Plan 2021 - 2030:
https://usercontent.one/wp/www.sodecade.org/wp-content/uploads/2022/04/Southern-Ocean-Action-Plan_Final.pdf
- ▶ DPSIR concept:
 - Structuring social data for the Marine Strategy Framework Directive:
<https://doi.org/10.1016/j.marpol.2013.11.004>
 - Does research applying the DPSIR framework support decision making?
<https://doi.org/10.1016/j.landusepol.2011.05.009>
 - Managing the Marine Environment: Is the DPSIR Framework Holistic Enough?
<https://doi.org/10.1002/sres.1111>
 - A problem structuring method for ecosystem-based management - The DPSIR modelling process: <https://doi.org/10.1016/j.ejor.2012.11.020>
 - A conceptual framework to assess the effects of environmental change on ecosystem services: <https://doi.org/10.1007/s10531-010-9838-5>

Projects:

- ▶ Invasive species biosecurity campaign: <https://www.polaralienhunters.com/>
- ▶ LTER (Long Term Ecological Research) interdisciplinary research project (with historians): <https://mcm.lternet.edu/>
- ▶ Systematic Conversation Planning: <https://www.scar.org/policy/scar-iaato-scp/>
- ▶ Southern ocean decade plan: https://www.sodecade.org/action-plan/https://usercontent.one/wp/www.sodecade.org/wp-content/uploads/2022/04/Southern-Ocean-Action-Plan_Final.pdf

Existing monitoring approaches:

- ▶ Antarctic Site Inventory (ASI): <https://oceanites.org/research-portal/antarctic-site-inventory/>
- ▶ Penguin Watch (citizen science project by Oxford University): <https://www.zooniverse.org/projects/penguintom79/penguin-watch>
- ▶ Happywhale (citizen science project): <https://happywhale.com/home>
- ▶ Monitoring of ship movement: <https://www.marinetraffic.com>
- ▶ Citizen Science projects around the world: <https://earthwatch.org/>
- ▶ Polar Citizen Science Collective: <https://polarcollective.org/there>

Reflexions

The aim of the workshop was to bring together stakeholders in Antarctic tourism - tour operators, National Competent Authorities, scientists, NGOs, etc. - to brainstorm and discuss options for monitoring tourism in Antarctica to find common ground. All participants bring their very own perspective on tourism in Antarctica, focus on certain aspects and have concrete preferences. In order to develop a truly functioning, overarching system for monitoring tourism activities, it is necessary to combine these different perspectives into a 360° view. Only then can the further steps be planned, which we can certainly take in different directions.

The workshop reflected earlier discussions within CEP/ATCM and clearly indicated the need for an overarching monitoring concept in Antarctica. However, there was also consensus that the development of such a concept is a demanding task and requires the consideration of a wide spectrum of aspects such as different geographical levels (site to global) and different forms of tourism as well as a broad range of environmental aspects on sea and land. The main objective of monitoring should be to determine whether and to what extent tourist activities affect the Antarctic environment. It should be kept in mind that concrete indicators must be defined that can be clearly attributed to tourism and not to global changes, such as climate change or other human activities, such as research activities. It has become clear that there are many approaches to monitoring and no "one size fits all" solution. We can learn from existing projects as well as from other regions of the world. The DPSIR approach is considered as a good approach to do so, but it needs to be adopted within the context of the Antarctic Treaty System as well as to the specifics of Antarctic tourism and the Antarctic environment in a holistic way. Even if several knowledge gaps exist, there is enough expertise to start the development of a concept. The remaining knowledge gaps should be made explicit and can be closed at a later stage.

Most participants agreed to the fact that the coordination of the monitoring should be within the Antarctic Treaty System, and that several stakeholders could be involved, also tourists themselves within distinguished Citizen Science Projects.

The system needs financing and some ideas about who could be involved have been raised. Most participants think that a major share needs to come from the tourists themselves. The money gained, however, should be clearly earmarked and transparently used.

There was also an agreement among the participants that further exchanges on this matter are needed. We will continue to share our findings and ideas and prepare the next workshop based on our experiences from WS I.

Next steps

The following next steps have been announced:

- ▶ Completion of the literature review.
- ▶ Based on the brainstorming made during this workshop the development of a first draft for a monitoring concept by the first half of 2023 is envisaged. This will also include existing projects (which still can be submitted to UBA).
- ▶ As we are at the beginning of the development process a small ad Hoc meeting with selected scientific staff could be held to discuss an early version of the concept
- ▶ The second workshop to discuss the first full draft for the monitoring concept with the participants of the first workshop in the second in the fall of 2023.

Annex A: Snapshots from the flipcharts

Question 1: Were all relevant drivers, pressures and environmental impacts identified?

DPSIR

- EIA as resources etc. - äventyr
- green house gas
- ship emissions

Spatial components

- fishery/CCMLA interaction
- presence judging set up monitoring
- many more drivers → detailed list missing



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niceday

Question 2: Which further knowledge gaps need to be considered in developing the monitoring system?

— political decision procedure

→ significance of impacts
↳ indicators

→ feedback loop „control“

Question 3: How can knowledge gaps be made explicit and how can they be addressed effectively in the monitoring system?

- current actions VS. con. standards
- overall action
- low level compliance
- Compliance monitoring \leftrightarrow environmental monitoring



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What should we monitor?

Impact Assessment → Permit → Monitoring

How do they do monitoring in other places? e.g. National Parks? #

compliance + effectiveness monitoring

Plan - Do - Check - Act

Where would the control site be?

↳ rotating visitor activity at some sites to detect change in the absence of activity
↳ Qs of consistency Implementation

Do impact assessments include everything they need to?

Are enviro impact assessments useful for tourism activity?

Alternative Model?

Activity	Impacts	Mitigation	Monitoring
- e.g. Ship activity	ice breaking noise wave action waste etc. NNS. emissions.	no waste disposal ballast exchange clean hull type of fuel	# ships location Site specific sensors/ Sampling/etc. research

* Issue of Scale: : local, regional, global
: site specific
: temporal variability

* Concept of a Tiered Monitoring Program

indicators
eg: sediment/water quality
targeted monitoring to identify impact = thresholds → mgmt
investigations → mgmt
e.g. penguins

Macro
Climate change
Biodiversity
- krill

Meso
Human presence
emissions

Local
Disturbance
emissions
waste
trampling
wilderness
values



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Monitoring for Management.

Monitoring for the Environment. : local vs regional

Maybe we are already Monitoring a lot : penguins, sea ice extent, temperature
what are the gaps? visitor numbers.
↳ what does the story tell us?

↳ emissions, site specific changes
plastic/micropollutants
emerging issues: disease, genetics
accumulation of all of the above
+ climate change.

Modelling?

How do we coordinate?

human activity

- Tourism
- NAPs. / COMNAP
- National Competent Authorities
- other stakeholders?

" THE PERFECT IS THE ENEMY OF THE GOOD. "

Reduce to something achievable

1. Carbon emissions + reductions
2. Effectiveness of management measures (perhaps have a focus due to EIA links)
3. Change in activity (already done by IAATO very well)
4. Non-native species
5. Identify a couple of key indicators e.g. penguins +/- = keystone sp.
which might be site specific
and/or comparable to different sites.
vegetation +/-
tracking / track formation
waste
Spills
trampling
etc.



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Who pays?

- THE USER
 - NAPs - Scientists crew
 - TOURISM OPERATORS - TOURISTS crew
 - OTHERS
 - Heritage Trusts
 - NGOs
 - Philanthropy
- Fishing (CCAMLR)

Who receives?

- Scientific Committee of Antarctic Monitoring
 - COORDINATING with SCAR COMNAP.
 - FUND
 - DATABASE
 - REPORTING
 - FEEDBACK DATA

↓
CEP

HOW MUCH?

$$100.000 \times 7 \times 25 \text{ £} \\ = \\ 17.000.000.5 \text{ £ p.y.} \\ = \\ 135 \text{ POSIDOCs}$$



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WHO SHOULD COORDINATE THE MONITORING?

- It should be within AT System
- A NEW SUBSIDIARY GROUP UNDER CEP ?
 - Technicians
 - Scientists
 - Infrastructures staff
- STRONG LINK TO IAATO AND ATS
- Who is going to implement that monitoring?

How to share these data?

- EIES Electronic information Exchange System
- What are we going to do with those data? Share it open?

ALTERNATIVES

~~COMNAP~~ CCAML R AS EXAMPLE

CCAML R Ecosystem Monitoring System (CEMP)

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Annex B: List of participants

	Name	Surname	Institution
1	Elena-Laura	ÁLVAREZ ORTEGA	Tilburg University
2	Kees	BASTMEIJER	Tilburg University
3	Jeanne	BAYLE	French Ministry of Europe and Foreign affairs
4	Javier	BENAYAS	Universidad Autonoma de Madrid
5	Daniela	CAJIAO	Universidad Autonoma de Madrid
6	Anne	CHOQUET	Université de Bretagne Occidentale
7	Steven	CHOWN	Monash University/SCAR
8	George	CLARKSON	FCDO
9	Guillaume	COTTAREL	TAAF
10	Kim	CROSBIE	Polar Tourism Guides Association
11	Thomas	DWORAK	Fresh Thoughts Consulting GmbH
12	Arthur	EIJS	Ministry of Infrastructure and Watermanagement (7021)
13	Marlynda	ELSTGEEST	IAATO
14	Rita	FABRIS	German Environment Agency
15	Anna Maria	FIORETTI	Italian Ministry of Foreign Affairs
16	Natasha	GARDINER	Antarctica New Zealand
17	Teresa	GEIDEL	Fresh Thoughts Consulting GmbH
18	Gina	GREER	IAATO
19	Tom	HART	University of Oxford
20	GEN	HASHIDA	National Institute of Polar Research
21	christy	HEHIR	University of Surrey
22	Victoria	HEINRICH	University of Tasmania
23	Heike	HERATA	German Environment Agency
24	David	HIK	Polar Knowledge Canada
25	Jacqueline	HILBERT	German Environment Agency
26	Astrid	HØGESTØL	Norwegian Polar Institute
27	Ute	HOHN-BOWEN	IAATO
28	Kevin	HUGHES	British Antarctic Survey

	Name	Surname	Institution
29	Doğaç Baybars	İŞILER	Polar Research Institute, TUBITAK MAM
30	Maude	JOLLY	Ministry of ecology
31	Lisa	KELLEY	IAATO
32	Ilan	KELMAN	UCL and UiA
33	Ji Hee	KIM	Korea Polar Research Institute
34	Yeadong	KIM	SCAR
35	Joanna	KRAWCZYK-GRZESIOWSKA	Ministry of Foreign Affairs of the Republic of Poland
36	Agnieszka	KRUSZEWSKA	Polish Antarctic Station Arctowski
37	Machiel	LAMERS	Wageningen University
38	Elizabeth	LEANE	University of Tasmania
39	Sebin	LEE	SCAR
40	YU-FAI	LEUNG	North Carolina State University
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71	Hanna	YEVCHUN	National Antarctic Scientific Center

Annex C: Agenda

Workshop on Tourism monitoring in Antarctica

Berlin, Estrel Berlin

28.05.2022, 9:00-16:30

08.00 – 09.00

Welcome of participants

Registration

Welcome Coffee and networking

09.00 – 09.05

Opening of the workshop and introduction

Brief motivation and objectives for the workshop

Dr Heike Herata, *German Environment Agency (UBA)*

09.05 – 09.20

An overview of Antarctic tourism by IAATO

Amanda Lynnes, IAATO

09.20 – 09.35

Tourism management in the context of multiple stressors in Antarctica

Tom Hart, Department of Zoology - University of Oxford

09.35 – 10.00

Presentation of the findings from the literature review (incl. gaps)

Thomas Dworak, Fresh Thoughts Consulting

Question and answers session

10.00 – 11.30

Split into 2-3 **working groups** to discuss the results from the literature review (incl. gaps) in parallel along with key questions set out in the discussion paper
Incl. Coffee break

11.30 – 12.00

Report back and question and answers

General discussion of reported issues

12.00 – 13.30

Networking lunch break

13.30 – 13.45

Presentation of first ideas for a comprehensive monitoring concept on the environmental impacts of Antarctic tourism

Thomas Dworak, Fresh Thoughts Consulting

Question and answers session

13.45 – 15.45

Discussion of the concept and brainstorming in 2-3 parallel **working groups** along with key questions set out in the discussion paper

Incl. Coffee break

15.45 – 16.15

Discussion of the concept and brainstorming in 2-3 parallel **working groups** along with key questions set out in the discussion paper

Incl. Coffee break

16.15 – 16.30

Final remarks, incl.

- Request for support for the work ahead
- Next steps

Dr Heike Herata, *German Environment Agency (UBA)*

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