

Scientific Tourism product prototype

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Introduction

This guideline document describes the different steps and considerations to design a scientific tourism product performed in the glacial environment of Hornafjörður and surroundings.

Tour Proposal - a science oriented outdoor experience

Status Quo

As a first step, an extended period was spent on evaluating options that seemed a good match given the existing customer base and the market establishment, knowledge, and the local environment for the company.

The existing customer base:

- Strong interest in outdoors and glaciers
- Little to moderate knowledge of glaciology
- Aware of and supports climate change and environmentalism in general
- Varying background in knowledge on climate science
- Speaks primarily German or English
- Moderate to strong interest and skills in photography
- Moderate to extremely high physical fitness
- Good to exceptionally suitable time budget and are usually interested in full-day tours
- Prefers private tours

Scientific knowledge within the company:

- Certified expert artistry in photography
- Strong knowledge of mapping and geospatial data processing
- Good foundation in glaciology and climate science
- Teaching experience in academic and secondary school environments

The local environment in Hornafjörður in Southeast Iceland can be characterised as follows:

- Multiple outlet glaciers within 60 minutes of driving and or hiking in; Hoffellsjökull, Fláajökull, Heinabergsjökull, Skálafellsjökull, and Breiðamerkurjökull, depending on meeting location
- Accessibility to the glaciers varies but is usually possible all year
- Higher mountains & accumulation zone of Skálafellsjökull reachable in summer by F985
- Shoreline of the Atlantic Ocean easily reachable

Horse breeding, bird life, local fishing industry and other potential aspects were not further explored since they did not appear to be a good match for the company and customer profile.

Candidate Tours and activities

Based on the customer base, existing knowledge, and environment, rough concepts for candidate tours were developed. Three such candidates were identified for closer evaluation:

1. **“Glaciers top to bottom”** – One day tour exploring the entire span of a local outlet glacier, from its accumulation zone to the terminus. Focus on delivering a better understanding of the mechanics of glaciers and how climate change affects them.
2. **“Mapping glacier changes using consumer level drones”** – a half to full day workshop explaining and demonstrating the use of affordable drone technology to document changing glaciers, both in the field and using photogrammetry software for assembly of maps.
3. **“Photography for climate change”** – a field lab of photography on or around the glaciers, specifically revisiting precise locations and re-shooting known perspectives for historical comparison and change estimates.

Evaluation of concepts

These concepts were then evaluated for a range of criteria, including requirement of pre-existing knowledge, technology, weather and seasonal aspects, timing, and location requirements, etc. Accessibility is labelled from green - which is easily fulfilled - yellow requires some concerns and red which could be problematic:

	Glaciers top to bottom	Drone mapping	Photography for climate change
Location (are specific places required or is choice of location flexible?)	Requires access to both névé and terminus area; only easy to reach within relatively short season. Crevasse risk high.	Glacier access not strictly required. Drone flying permits & noise aspects must be considered.	Some glacier access required for best results but easily managed.
Weather (is the tour impacted by weather conditions?)	Doable in most conditions.	Good conditions required for drone flight.	Doable in most conditions.
Season (can the tour be offered year round?)	Short season in summer.	All year but best results in summer	All year.
Duration (how much time do clients need to plan for?)	Full day, long access.	Flexible, but potentially two days for calculations to complete.	Flexible, but ideally full day.
Facility (are indoor facilities or other special locations needed?)	No	Yes, for a longer duration for post processing and computer work.	Preferable to evaluate pictures, but not strictly required (any indoor location will do).
Difficulty (is the tour physically or technically challenging?)	No	No	No
Equipment (do clients need any particular equipment?)	No	Drone, specialised software, high-end computer	Camera, but any modern phone will also do. Laptop or tablet ideal.
Audience (main interests of potential customers)	Glaciology, climate science	Drone enthusiasts, climate science, environmentalism	Climate science, environmentalism, photography.
Prior knowledge (Is any prior knowledge required by clients?)	No	Preferable for best results, but not strictly required.	No
Group size (is there a lower / upper limit on participants?)	Group size limited by glacier navigation and crevasse risk.	Safety requirement of only one drone in the air, ideally 1-3 participants.	No particular limitation.
Value (how valuable / useful is the knowledge gained?)	Moderate (no immediate application but possible indirect benefits)	Low - moderate (unlikely to be of much use)	Moderate - high (good potential for further application 'at home').
Transferable (can clients easily transfer knowledge to other people / settings?)	Limited (probably requires similar environment for best results)	Yes, within limits (steep learning curve, limited audience)	Yes, same concepts can be applied at home to any other long term documentation efforts.

While all three concepts are certainly within the reach of the company to implement successfully, as a first prototype the “Photography for climate change” field lab clearly shows the best potential and was therefore chosen for further development.

Tour development

The next step was to design the prototype tour in more detail, including any required supplementary materials, timing, and location(s). The timing and overall layout is a “*best guess*” based on prior experience with similar activities and it is expected that feedback and insights learned from initial trial runs will lead to refinements of all aspects of the tour.

Starting with a more detailed overall concept of the tour, it is easy to derive the target objectives; what we would like our customers to experience and learn, and then arrange the sequence of activities and timing required to achieve those. Ideally, the same overall concept is written in a way that can also be directly used for describing the tour to potential clients. In addition, supplementary materials, and background information relevant to the tour can also be readily identified.

Refined concept

The following tour description was written in a way that clearly defines our goals of the tour, which both gives potential clients a clear picture of what to expect and immediately provides a logical structure for the tour.

Photography for Climate Change is a full day field lab that introduces our visitors to document climate change in the world around us. We will focus on the rapidly changing environment of the Icelandic glaciers, learning how they are affected by rising temperatures and other shifts in weather patterns, and how we can best use our cameras and smart phones to document those changes. We will compare them to observations and images made by other visitors in weeks, months, and years past, correlated them to modern and historic maps, and learn how we can make our own observation available for future reference to other visitors and scientists alike.

Citizen science empowers all of us to gain a better understanding of the world we live in, and modern technology allows us to contribute to important observations on a far broader scale than ever before.

Learning objectives

After the tour, clients should:

- Have a better understanding of the overall mechanisms of climate change, understand what exactly is happening
- Be able to identify and anticipate changes to glaciers and other environments, understand where we take pictures now such that future observations are most useful

- Know how to use cameras and or smart phone to document those environments; viewpoints, directions, framing, etc.
- Be able to identify landmarks from reference images and locate themselves close to the original camera location for comparison pictures
- Know how to compare their observations to historical maps and make reasonable estimations about them
- Be able to find platforms for sharing their images and observations with others

Furthermore:

- Know how to use image editing software to make direct overlays of historical images, accounting for differences in focal length and other characteristics
- Be inspired to keep making observations and documenting in their own home environment
- Want to learn more about other aspects of citizen science

Although photography plays a vital role in the documentation process, the artistic process of landscape photography is less important for these purposes. Therefore, even the most basic understanding of the camera in automatic mode or simply using a cell phone, will more than likely be perfectly adequate.

Tour structure

Based on the objectives and general concept of the tour, the following structure was derived. The timing is an estimate based on prior experience with similar activities and will need to be evaluated and adapted during test runs.

	Duration	Description
0	10m	Initial meeting at designated location. Introduction, quick check of clothing & gear.
10m	20m	Discussion about the location we will visit. Studying map & reference photos we want to reproduce / compare against (3-5 locations). Explanation about which changes we may anticipate and how they are relevant.
30m	45m	Drive to trail head & hike to initial location
1h 15m	30m	At first location, more detailed instructions on camera usage, reproducing accurate
1h 45m	2h	Moving to subsequent locations (driving and/or on foot), checking against reference
3h 45m	45m	Return hike & drive to indoor location
4h 30m	1h	More detailed comparison of new photography against reference material
5h 30m	30m	Discussion about future developments, citizen science platforms for data sharing,
6h		Tour ends.

Supplementary material

The following supplementary material and background information will be required or at least beneficial for both the operation of the tour, and as a further reading to encourage clients to deepen their understanding and furthermore aid them in communicating their new knowledge to their peers.

This is a preliminary list and is expected to be expanded after initial trial runs of the tour

- Summary of the evolution of local glaciers within the last decades
- Historical maps as reference material
- Map of locations to be visited
- Fact sheet about climate change and its impact on Icelandic glaciers
- Links to related citizen science projects

Tour location

As a next step, potential areas will be evaluated for accessibility, nearby infrastructure or indoor facilities, and range of suitable locations. An initial trial run will then be held in late June till early July.