

AMBER

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D5.4 Smartphone/tablet application (AMBER app)

This is the 1.0 version of the Smartphone/tablet application (AMBER app) Deliverable. This document is a deliverable of the AMBER project.

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Executive summary

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This smartphone/tablet application has been developed to enable users to both collect and assess barrier data. Volunteers will use the AMBER app to take geo-referenced photos of stream barriers across Europe and upload them directly onto the citizen science portal (D5.8).

Authors

Rosa Olivo del Amo, Joost van Deelen, Bas Deelman, Herman Wanningen from the World Fish Migration Foundation for the AMBER consortium.

Contents

1	Introduction	5
2	REQUIREMENTS FOR AMBER Smartphone App	6
2.1	Appealing to a wide non-specialist audience	6
2.2	Data	7
3	Citizen Science app - testing the beta version	7
4	App Interface	7
4.1	Tier 1 Interface	8
4.2	Tier 2 Interface	10
5	User types	11
5.1	Unregistered users	11
5.2	Registered users	11
6	Data treatment and verification	12
6.1	Sending data from app	12
6.2	Storage and Coincident site detection	12
6.3	Verification of data	12
	APPENDIX: PHOTOGRAPHS	13

1 INTRODUCTION

World Fish Migration Foundation (Ben. 8 - WFMF) has developed a smartphone application called **AMBER Barrier Tracker** under the Citizen Science Programme. With this application participants can upload new barriers into a database. Combining the smartphone application with the Citizen Science programme allows for the gathering of more data and greater spatial coverage of records than would have been possible using conventional surveys.

The AMBER smartphone app is now available from the google play store (Android) & app store (iOS). Either search for “**Barrier tracker**” in the store, or directly downloaded it from:

- Android: https://play.google.com/store/apps/details?id=com.natural_apptitude.amber&hl=en
- iOS: <https://itunes.apple.com/al/app/barrier-tracker/id1246829944?mt=8>

The official release to the public will be during World Fish Migration Day 21 April 2018. This ensures a larger pan-European impact; allows time for translations; and enables an earlier release to water managers and river specialists for further (external) testing and to populate the map with data prior to the first public pan-European roll-out.

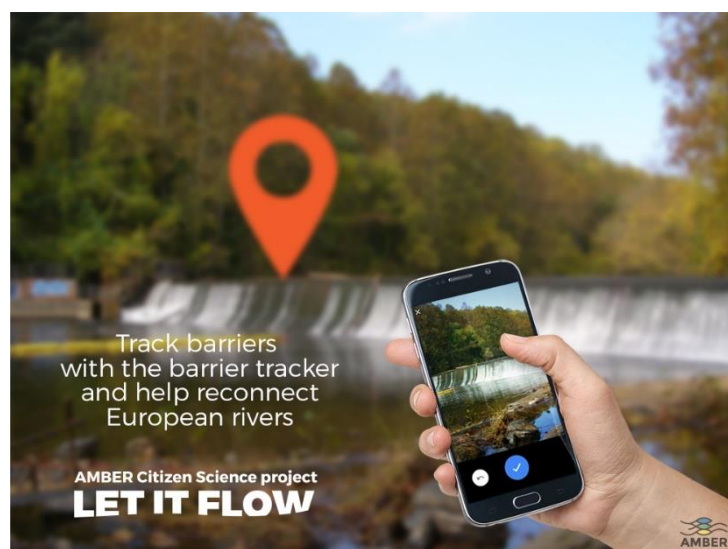
Statement of Purpose of the ‘Barrier Tracker’ app:

The AMBER Barrier Tracker app has been developed to collect Citizen Science data on physical barriers to the movement of river flora and fauna, throughout the 31 EEA member countries, and also Switzerland and Andorra.

This data collection will:

1. assist in the estimation of barrier numbers in different countries;
2. involve the public in understanding the importance of connectivity in rivers;
3. provide useful data on simple barrier characteristics which affect biological connectivity.

Efforts to collect National and Regional authority data for the AMBER Atlas (See deliverable D1.2) are being made outside these countries, i.e. in the Balkan regions (Albania; Bosnia and Herzegovina; Macedonia; Montenegro; Serbia). Although not planned within the timeline of AMBER, there may be future potential to use the app in the Balkans or even further afield.



2 REQUIREMENTS FOR AMBER SMARTPHONE APP

2.1 Appealing to a wide non-specialist audience

Lessons were learnt from the development of similar apps on the market which had low uptake. It was considered imperative that the app be accessible and useable to the public throughout the EEA, and would have high uptake both for reasons of collecting data and for publicising the EC funded work of AMBER to a large audience. Thus features of the app are:

1. *No necessity for registration*

To ensure the public were not afraid of installing the app no email data or registration details have to be given. Users can register and take advantage of interactions on the AMBER web-interface such as leader-boards and viewing their data by username or other users by username (not actual name). Rigorous data protection procedures have been employed in the development of the app (see Deliverable D6.3 Data Management, and also within the app itself).

2. *Minimum data input requirements*

The app is intended to appeal to non-specialist users. Thus, users can potentially do as little as take a photo (which is geo-located and dated). This enables specialists or indeed other app users to find the barrier and provide additional details. Having just a geolocated photo still fulfills the prime purpose of the app, which is to get a realistic idea of the number of barriers within different EEA Member States. However, initial users are prompted for other additional simple barrier information (Tier 1). Experienced or more specialist users are also able to supply more complex information than this in a 'Tier 2'.

3. *A simple and interface*

An intuitive app with clearly understandable symbols and little or no text typing was considered necessary both for ease of use and for ease of updating the languages it would be provided in, as well as to speed up input. Short descriptions of barrier types with example photos were integrated in a non-obstrusive way to ensure that non-specialist users could use the app immediately. However, additional material on barrier types and the importance of monitoring the barriers is provided on the online Citizen Science web-interface.

4. *Useable without good internet or GPS connection*

Due to many barriers being in remote areas or with significant tree cover the app cannot be dependent on signal reception to locate the barrier. Thus there was a necessity to be able to upload the site data on returning from the field (if no internet) and to be able to locate or improve the location of the barrier on a map manually (if GPS signal is weak or absent).

5. *Useable on different platforms and different countries*

- Available for both Apple iOS (version 8 and above) and Android* (version 4.4 and above)
- Hybrid app code i.e. one code-base deployed and optimised for both platforms
- Ability for user to login via standard username/password, Open Authentication (Twitter, Google, FB) or submit without prior authentication or registration
- Ability for user to select his/her language (availability in multiple European languages)

(*) The app was initially intended to be used on the Windows Smartphone, to ensure all smartphone owners could use it. However, the market share Globally is <1 % 2017 and is rapidly decreasing, with support for the Windows Phone Operating System having been officially stopped.

<https://www.recode.net/2017/7/17/15984222/microsoft-windows-phone-mobile-operating-system-android-iphone-ios>

2.2 Data

The AMBER Barrier Tracker data character characteristics:

- The app records and submits data and stores it in a backend system.
- Verification of submitted records can be done by experts from the AMBER consortium in a backend system.
- Data can be exported or imported into any other systems via API key.
- This Citizen Science Data will be imported periodically to form a separate spatial layer in the “AMBER Barrier Atlas” which is the AMBER barrier database of collated barrier data from National and Regional Authorities (See deliverable D1.2).
- The contractor fulfils the data protection regulations for storing any personal data.
- Geo-location gives a GPS accuracy estimate with the option to move the location pointer to a more precise location. This is useful both when the GPS is not functioning and since the user may be some distance from the barrier when taking the photo.

3 CITIZEN SCIENCE APP - TESTING THE BETA VERSION

The 3rd Party contractor ‘Natural Apptitude’ gained the tender for developing the app (and accompanying Citizen Science website) based on being the best value for money (according to Article 10.1.1 of the EC H2020 Annotated Model Grant Agreement). This was evaluated on an unbiased and clear scoring system of 21 different criteria including cost, maintenance, experience and risk.

Requirements and desired functioning for the Smartphone application were built by Natural Apptitude working to specifications of WFMF. These specifications were discussed and refined with the involvement of all AMBER partners. WFMF shared the test version with the AMBER beneficiaries and incorporated their feedback.

4 APP INTERFACE

The AMBER Barrier Tracker has been developed in two separate stages: Tier 1 (simple app) and Tier 2, which is an extension of Tier 1, specifically for expert users.

4.1 Tier 1 Interface

The app features:

1. “Home”:

Record a New Obstacle or View My Records

After recording an obstacle user will automatically be directed to “My Records” page for submitting their records.

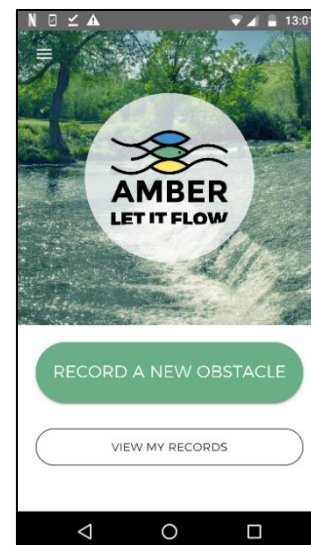


Figure 1. “Home” page of Barrier Tracker app

2. A drop down menu featuring:

“My Records” page(s):

- ✓ Pending records
- ✓ Submitted records: Show how many barriers have been submitted in total by user;
- ✓ Record status: Their ‘status’ based on the number of their submitted records that have verified i.e. beginner (<5), explorer (5-20), expert (>20).

“My Account”

- ✓ Rank;
- ✓ Submitted records;
- ✓ Verified records;
- ✓ Total AMBER records;

“Information”

- ✓ About AMBER: project information;
- ✓ Connect with us: project social media;
- ✓ Data privacy: data policy page, including personal data protection;
- ✓ Health and Safety advice page;
- ✓ App Information;
- ✓ App Guide: App guide on how to use the app most effectively

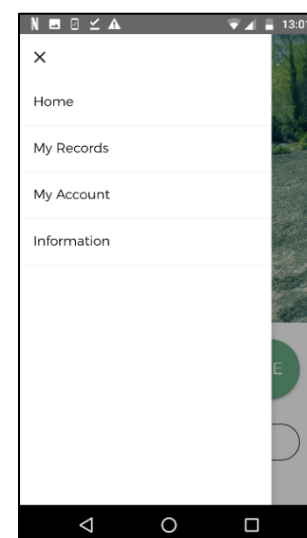


Figure 2. Drop down menu on home page

Table 1. Tier one “Record a New Obstacle” page(s) includes the following attributes:

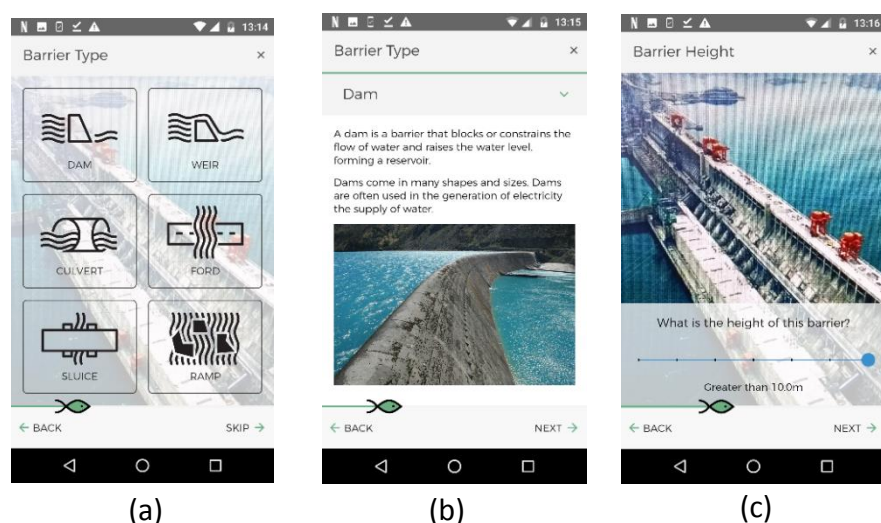
Question	Obligation to submit record	Automatic or manual	Answer types
Barrier Photo	Obligatory	Automatic opening, manual shutter control and option to retake image: camera opens upon opening “record obstacle” page	User defined (photo)
Date of record	Obligatory	Automatically, upon taking photo	Date in format Hours/minutes/seconds & Day/month/year
Barrier Type	Optional	Manual	Weir, dam, culvert, ford, sluice, ramp (with images to aid in making the choice)
Barrier Height	Optional	Manual	Height categories: <0.5 meters; 0.5 - 1.0 m; 1.0 – 2.0 m; 2.0 – 5.0 m; 5.0 – 10.0 m; >10.0 m
Does the barrier extend across the entire watercourse?	Optional	Manual	yes/no
Is the barrier in working condition?	Optional	Manual	yes/no/don't know
Please add any additional notes	Optional	Manual	
Barrier Location (Geo-location of obstacle)	Obligatory	Automatic, upon taking photo. Prompt for GPS (locate) to be used if not switched on. App records whether location was taken based on GPS, phone signal or both.	lat/long coordinates via GPS chipset on phone and where there is a suitable signal, the phone signal.

Figure 3.

(a) Barrier Types (with user photo of barrier behind)

(b) In-app information On barrier type

(c) example of how data is input; barrier height.



4.2 Tier 2 Interface

This is for explorer and expert users who have more than 20 verified records. This allows further information to be provided and is particularly useful for data recording with more specialised users. It uses the menu selection of obstacle types from Tier 1 but asks for more detailed information specific to that obstacle. All additional data in tier 2 is optional.

Table 2. Tier two ‘record obstacle’ pages include the following attributes:

Category selected following ‘obstacle type’ question	Additional information collected (pt1)	Additional information collected (pt2)
Weir	Vertical, sloped, stepped	-
Dam	overflow dam; wing dam; check dam; arch dam; barrage; embankment dam; don’t know	-
Culvert	(1) width of culvert; don’t know	
Ford	(1) depth category: dry; shallow (<15cm); deep (>15cm); don’t know	-
Sluice	(1) width of sluice gate; don’t know	(2) depth of sluice gate; don’t know
Ramp		

Another page for additional information apart from the barrier type is also requested, also optional (table 3).

Table 3. Tier two ‘record obstacle’ page(s) includes the following attributes:

Question	Additional information collected (pt1)
Fish pass present?	yes/no/don’t know
River width	Estimate in meters; don’t know
River Name	Name of river
Flow conditions	Flow condition at time of recording: Low/regular/ high

5 USER TYPES

5.1 Unregistered users

Unregistered users can record and submit barrier data from the Tier 1 interface anonymously, however cannot see their scores in the “my records” page. They are prompted to see if they want to register upon submitting records.

5.2 Registered users

Registered users can record and submit barrier data from the Tier 1 interface, see their scores in the “my records” page.

- Beginner users (<5)
registered users automatically become beginner users.
- Explorer users (5-20)
registered users automatically become explorer users when the number of records submitted exceeds 5.
- Expert users (>20)
registered users automatically become expert users when the number of submitted records by a user exceeds 20. Once these records are validated they have access to the Tier 2 interface.

6 DATA TREATMENT AND VERIFICATION

6.1 Sending data from app

Data is uploaded to the Coreo back-end system of the contractor. The app allows the data to be uploaded after the data was collected i.e. when the phone has an internet connection (many of these surveys will take place in the field where there is no phone reception or internet connection).

6.2 Storage and Coincident site detection

The company will maintain the data within Coreo and also maintain the application until 31 May 2020 in the first instance, as well as the coordination with JRC to ensure the smooth transfer of data.

6.3 Verification of data

Data that has been submitted by a user will be verified by a select group of validators. These are specific people involved within the AMBER project which have the ability to log on to the back-end system.

APPENDIX: PHOTOGRAPHS

Example images from the Barrier Tracker app in use, including data input, geolocation and record submission.

