



TECHNICAL GUIDE TO CITIZEN SCIENCE BIODIVERSITY MONITORING IN LEBANON

Prepared by Yara Alchammas,
Biodiversity Data Analyst, SPNL - May 2023, Beirut
Under a project entitled : “BioConnect” and Funded by the European Union

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EXECUTIVE SUMMARY

INTRODUCTION

This technical guide to citizen science participation in biodiversity monitoring is based on the instructions from a theoretical manual for citizen science application in Lebanon. It's a way to involve local communities in the monitoring of the health of any fauna, flora and land surrounding them.

Instructions from this technical guide include field templates and questionnaires to create knowledge about:

- Fauna biodiversity,
- Flora biodiversity,
- Hunting practices,
- Land productivity conditions,
- Farmer and pastoralist practices,
- Riverine ecosystems conditions.

Any knowledge created by citizen science biodiversity monitoring will be properly stored, analyzed, and represented to help out in decision-making and governance of Himas in Lebanon.

This technical guide will be applied over a one-year trial period and is subject to adaptations to better fit citizen scientists' needs and abilities.

In the context of monitoring Himas, and protected areas, these techniques of citizen science are a way of involving local communities at the data collection stage to co-create knowledge. This is a pertinent way for biodiversity monitoring projects to gain legitimacy in the public eye.

The main objectives of this technical guide are:

- 1.** To gather data on all ecosystem health aspects of Himas (flora diversity, fauna diversity, forest conditions, waterway conditions, soil quality...) in a cost-effective manner year-round,
- 2.** To center social and ecological outcomes of any changes in biodiversity and ecosystem indicators,
- 3.** To involve local communities in the technical aspects of monitoring their environment.

METHODS

Sampling Locations

When citizen scientists arrive at a specific Hima, there are several sampling points designated by signs with the indications as follows: “[Name of Hima] [number of the point]”. Unless indicated otherwise, sampling is done in the vicinity of a 300-meter radius around these general points.

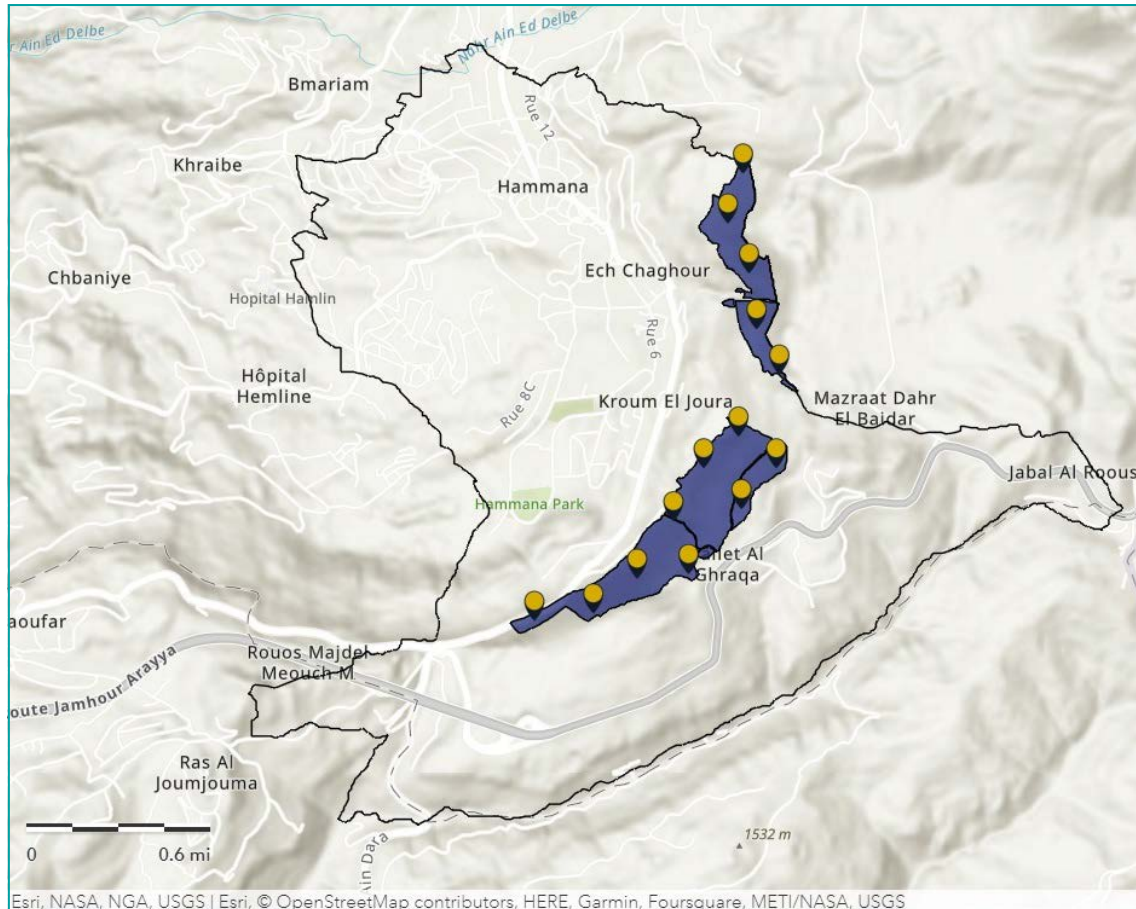


Figure 1 Map of Hima Hammana with 14 main sampling points.

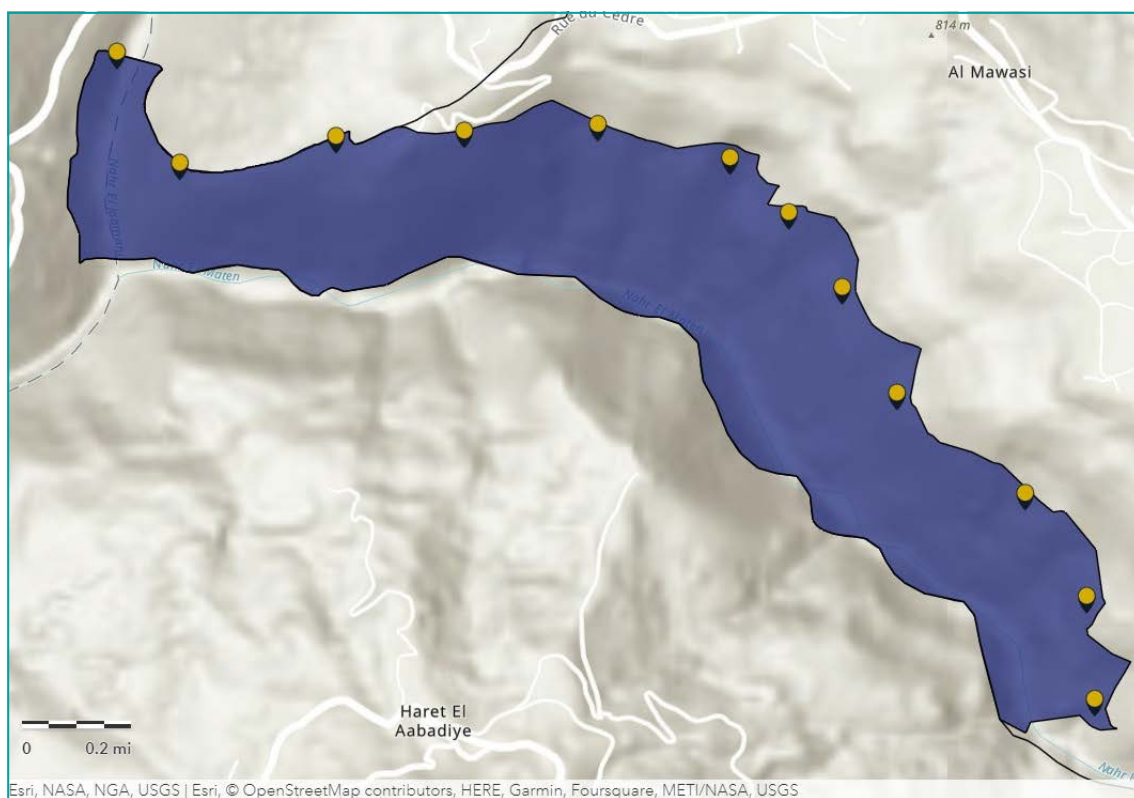


Figure 2 Map of Hima Ras el Matn with 12 main sampling points.



Figure 3 Example of sampling point indication in Hima Hammana.

For more precise information sampling, such as plant identification, citizen scientists will find two signposts or markers placed in the 300-meter radius of each of the main sampling points. Precise information sampling is done in a 25x25 meter quadrant around the markers.

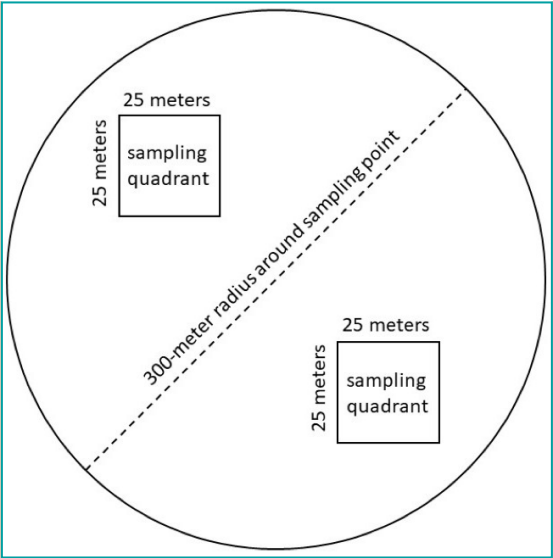


Figure 4 Diagram serving as a visual aid of precise sampling point placements.



Figure 5 Example of precise sampling point indications in the field.

Bird Surveys

Stakeholders concerned by bird sampling and ways to engage them:

- Birdwatchers: through communication with local organizers of birdwatching outings,
- Nature photographers: through communication with local organizers of birdwatching outings,
- Hikers and guides: through communication with local guides (they can ask any hikers to participate),
- Farmers and pastoralists: through awareness campaigns on how bird biodiversity can aid them with their work,
- Hunters: through awareness campaigns on the importance of sustainable hunting practices and bird biodiversity,
- Local communities with knowledge of bird populations: motivation by Homat al Hima trainings and awareness campaigns on the importance of bird biodiversity,
- Protected area managers: staff or rangers working closely in the field.

Birds are very mobile animals, they spend most of their lives at considerable distances from the place they are born in, and the place they reproduce in. The peak of their sedentary activity is when they are building their nests and reproducing.

Bird species that are residential in Lebanon will most likely reproduce between the months of March and May, with a peak in April. Bird species that migrate to Lebanon will most likely reproduce between the months of April and June, with a peak in May.

If weather conditions are too windy, it will probably be very difficult to see or hear any birds, and the count should be rescheduled. Rainy conditions are not a problem for these bird counts as long as temperatures are not too low (under 3 or 40C). Instructions for bird counts during the reproduction period:

- Observations should be done once a week between March and June,
- Observations should start early in the morning (around 7 am for optimal bird activity),
- Birds are recorded in the same point for 15 to 20 minutes,

- Birds heard and seen are recorded,
- If any other animal is seen and recognized, it should be noted down in the designated area.

The major form of mobility birds exhibit is their migration, with entire populations passing over Lebanon between the months of September and November. Instructions for bird counts during the migration period:

- Observations should be done once a week between September and November,
- There is no optimal time to start observations, but they will preferably start in the morning to count as many birds as possible,
- Birds are recorded for 2 to 3 hours at least,
- The numbers of birds in big passing flocks are estimated as accurately as possible.

Needed material for bird counts:

- Binoculars,
- Wristwatch and cellphone,
- Bird guide,
- Pencil,
- Field templates and guiding material.

Bird Survey Field Template

General Information

Date		Weather conditions	<i>rainy, windy, sunny, cloudy...</i>
Name		Temperature	
Time started		Wind speed	
Time finished		Site and point name	

Priority Bird List

Species	Number	Comment
Barn swallow		
Black-winged stilt		
Chukar partridge		
Common cormorant		
Common crane		
Common kingfisher		
Common sandpiper		
Common swift		
Eastern imperial eagle		
Egyptian vulture		
Eurasian stone curlew		
Eurasian wryneck		
European bee-eater		
European goldfinch		
Greater spotted eagle		
Green sandpiper		
Hooded crow		
House sparrow		
Little egret		
Palestine sunbird		
Purple heron		
Rock dove		
Rock sparrow		
Ruff		
Somber tit		
Syrian serin		
Syrian woodpecker		

Turtle dove		
White stork		
White wagtail		

Other Birds List

Species	Number	Comment

Other Fauna List

Species	Number	Comment

Hunter Surveys

During hunting season, any observed hunters should be solicited to fill out the bird diversity questionnaire. If they are violating any of the rules of hunting law 580/2004, this should be reported.

Hunting law 580/2004 organizes hunting activity in Lebanon with the objective of protecting fauna and wildlife, ensuring sustainability, and recognizing the heritage value of species.

Some of the most important rules to follow are:

- No hunting of endemic, rare and threatened species,
- No hunting and trapping of internationally threatened species and all species during nesting seasons,
- No hunting of resident and migratory birds and terrestrial mammals unless they are designated as game,
- No collection of eggs and nestlings,
- No use of sticky bars, bird voice recordings, nocturnal attractions, and other restricted hunting tools,
- No hunting in protected areas and national parks, sites of historical or religious importance, public parks and gardens, and areas completely covered with snow,
- No hunting at less than 500 meters from inhabited areas.

It is mandatory for the hunter to carry with them a gun license, a hunting license, and accident insurance. Hunting season is between the 1st of September and the 15th of February of the following year, and hunting is only allowed between sunrise and sunset.

Hunting is not allowed in location 1, Hammana, but it is allowed in location 2, Ras el Matn.

Mammal species considered as game are:

- Wild boar (*Sus scrofa*)
- Cape hare (*Lepus capensis*)

Bird species considered as game are as follows:

- A bag of 5 of the water bird species:
 - Mallard (*Anas platyrhynchos*)
 - Teal (*Anas crecca*)
 - Garganey (*Anas querquedula*)
- A bag of 5 of the pigeon species:
 - Rock dove (*Columba livia*)
 - Woodpigeon (*Columba palumbus*)
- A bag of 20 of the thrush species:
 - Song thrush (*Turdus philomelos*)
 - Mistle thrush (*Turdus viscivorus*)
- 20 individuals of Quail (*Coturnix coturnix*)
- 5 individuals of Eurasian woodcock (*Scolopax rusticola*)
- 50 individuals of Calandra lark (*Melanocorypha calandra*)
- 10 individuals of Fieldfare (*Turdus pilaris*)
- 25 individuals of Chaffinch (*Fringilla coelebs*)

All other species, including all birds of prey, storks, and other migratory birds, are strictly protected.

Bird Diversity Questionnaire for Hunters

General Information

Name		Weather conditions	<i>rainy, windy, sunny, cloudy...</i>
Date		Site name	
Time		Point name	

Contents of Bags

Note down the number of each of the following bird species that you have caught today:

Bag of water birds	<input type="text"/>	Mallard	Bag of pigeons	<input type="text"/>	Rock Dove
	<input type="text"/>	Teal		<input type="text"/>	Woodpigeon
	<input type="text"/>	Garganey			
Other birds	<input type="text"/>	Quail	Bag of thrushes	<input type="text"/>	Mistle Thrush
	<input type="text"/>	Eurasian Woodcock		<input type="text"/>	Song Thrush
	<input type="text"/>	Calandra Lark			
	<input type="text"/>	Fieldfare			
	<input type="text"/>	Chaffinch			

Other Bird Species

Did you see and/or any other bird species that you recognize?

☐ No

☐ Yes

If you answered Yes, please fill out the following:

Species	Number	Comment

Flora Surveys

For the completion of this task, citizen scientists will find two signposts or markers placed in the 300-meter radius of each of the 14 main sampling points. Precise information sampling is done in a 25x25 meter quadrant around the markers.

Stakeholders concerned by flora surveys and ways to engage them:

- Nature photographers: through communication with local organizers of nature outings,
- Hikers and guides: through communication with local organizers of nature outings,
- Local communities with knowledge of plants: motivation by Homat al Hima trainings and awareness campaigns on the importance of plant biodiversity,
- Pastoralists and farmers: through awareness campaigns on how plant biodiversity can aid them with their work and how their practices might affect the ecosystems around them,
- Protected area managers: staff or rangers working closely in the field.

Flora surveys should be done once a month year-round, except between the months of April and July when flora surveys should be done twice a month as plants are in full bloom during this period.



Figure 6 Diagram representation of the imagined circle used to evaluate canopy openness.

Canopy openness is determined by standing on the ground in the middle of the sampling quadrant, looking up and imagining a circle, and estimating the percentage of visible sky (not obscured by vegetation) in that imaginary circle. This is the most accessible and cost-effective method to measure canopy openness, especially when using citizen science.

Other elements of flora surveys are represented by pictures used as examples of what citizen scientists should be recording in order to minimize confusion.

Needed material for flora surveys:

- Wristwatch and cellphone,
- Flora guide,
- Pencil,
- Field templates and guiding material,
- String or other measurement device.

Flora Survey Field Template

General Information

Date		Weather conditions	<i>rainy, windy, sunny, cloudy...</i>
Name		Temperature	
Time started		Wind speed	
Time finished		Humidity	
Site and point name		Signs of hunting	<i>yes/no</i>
Quadrant name		Signs of quarrying	<i>yes/no</i>

Canopy Characteristics

Canopy cover	
# trees <5m	
# trees 5-10m	
# trees 10-20m	
# trees 20-30m	
# trees >30m	

Canopy scope	
Canopy Openness	<i>% of sky covered by trees when looking up</i>
Tree species	
Dominant species	

Fire Risk Factors

Distance to roads	
Distance to urban settlements	
Distance to agricultural land	

% of moss, lichens, ferns	
% of dead woody material	
Moisture of forest litter	<i>wet/moist/dry</i>

Grazing Pressure

Accessibility	<i>yes/no</i>
Livestock dung piles	<i>yes/no</i>

% of vegetation ground cover	
% of weed species	

Herbivore and Human Disturbance

Impact	Tree species/mammal species/comment/observation
Bark stripping and stem breakage	<i>disturbance + tree species + number of affected trees</i>
Ground disturbance	<i>note down tracks, scrapes, depressions in mud or water...</i>
Herbivore signs	<i>note down wool, hair, fecal pellets, eaten cones...</i>

Diseases and Parasites

Disease/Parasite	Plant species	Plant part	Number of affected individuals

Priority Flora Species List

Species	Number	Comment
<i>Abies cilicica</i>		
<i>Arbutus andrachne</i>		
<i>Arum hygrophilum</i>		
<i>Cedrus libani</i>		
<i>Cousinia libanotica</i>		
<i>Crithmum maritimum</i>		
<i>Dittrichia viscosa</i>		
<i>Drimia maritima</i>		
<i>Iris sofarana</i>		
<i>Micromeria libanotica</i>		
<i>Orchis romana libanotica</i>		
<i>Origanum ehrenbergii</i>		
<i>Origanum syriacum</i>		
<i>Otanthus maritimus</i>		
<i>Pancratium maritimum</i>		
<i>Pinus halepensis</i>		
<i>Quercus calliprinos</i>		
<i>Quercus infectoria</i>		
<i>Quercus look</i>		
<i>Romulea nivalis</i>		
<i>Silene makmeliana</i>		
<i>Stachys ehrenbergii</i>		

Other Species List

Species	Number	Comment

Land Productivity Questionnaires

Farmers and pastoralists should be solicited to fill out land productivity questionnaires twice a year:

- The first time after the spring season, in the middle or towards the end of June, where they should be asked only about priority species they see around their lands,
- The second time after the autumn season, in the middle or towards the end of November, where they should be asked about their practices as well as about priority species.

Farmers and pastoralists solicited to fill out land productivity questionnaires should have the liberty of staying anonymous.

It should be explained to farmers and pastoralists that the aim of the land productivity questionnaires is not to pass judgement on their practices or traditions, but more so to assess the health of the ecosystems in the region.

Land Productivity Questionnaire for Pastoralists

Name		Date	
Site and Point name		Time	

Where would you say the most productive land in Hammana/Ras el Matn is, and why?

Where would you say the least productive land in Hammana/Ras el Matn is, and why?

What is the average size of your cattle herd?

What animals constitute your cattle herd?

What is the product generated by your herd?

<input type="checkbox"/>	Meat
<input type="checkbox"/>	Milk
<input type="checkbox"/>	Animal skin
<input type="checkbox"/>	Wool

What is your grazing system?

<input type="checkbox"/>	Continuous grazing (<i>no or infrequent pauses from grazing</i>)
<input type="checkbox"/>	Rotational grazing (<i>rotations of cattle organized around plant growth</i>)
<input type="checkbox"/>	Cell grazing (<i>rotation of cattle inside paddocks</i>)

Do you combine your pastoral activities with agriculture?

☐ No ☐ Yes

Do you supplement your income from pastoralism with any other job?

☐ No ☐ Yes

If you answered Yes on the last question, feel free to elaborate:

Which priority species have you been observing this season?

Species	Number	Comment

Land Productivity Questionnaire for Farmers

Name		Date	
Site name		Time	

What is your approximation of the area (in square meters) of the following land categories on your farm?

Total farm area

Productive land

Non-productive land

Hedges

Grasslands

Woodlands

Water courses

What are the crops produced on your farm?

Crop	Area covered (m ²)

Do you use fertilizers?

☐ No

☐ Yes

If you answered Yes, what type of fertilizer do you use?

Do you use pesticides?

☐ No

☐ Yes

Do you use any alternative methods to control pests and plant diseases?

☐ No

☐ Yes

If you answered Yes, what methods do you use?

Do you use herbicides?

☐ No

☐ Yes

Do you use any additional practices to manage weeds?

☐ No

☐ Yes

If you answered Yes, what practices do you use?

Do you practice crop rotation?

☐ No

☐ Yes

Does your farm have any livestock?

☐ No

☐ Yes

Do you use antibiotics for livestock disease management?

☐ No

☐ Yes

What livestock do you have on your farm?

Animal	Number

Which priority species have you been observing this season?

Species	Number	Comment

Riverine Ecosystem Conditions Assessment

Stakeholders concerned by assessment of riverine ecosystem conditions and ways to engage them:

- Hikers and guides: through communication with local guides (they can ask any hikers to participate),
- Local communities with knowledge of waterways: motivated by Homat al Hima trainings and awareness campaigns on the importance of water conditions,
- Protected area managers: staff or ranger working closely in the field,
- Water sports lovers: through communication with local event and competition organizers.

Freshwater lakes and rivers are supporters of biodiversity in terrestrial and aquatic ecosystems and provide important ecosystem services relevant to human health and socio-economic gains. Water turbidity is an important indicator of river health as it affects light transmission to the bottom of rivers, and changes in fish behavior. Water turbidity is determined by taking a water sample from the freshwater body in a transparent container and assessing it on a scale from 1 to 5 using the following picture as reference:

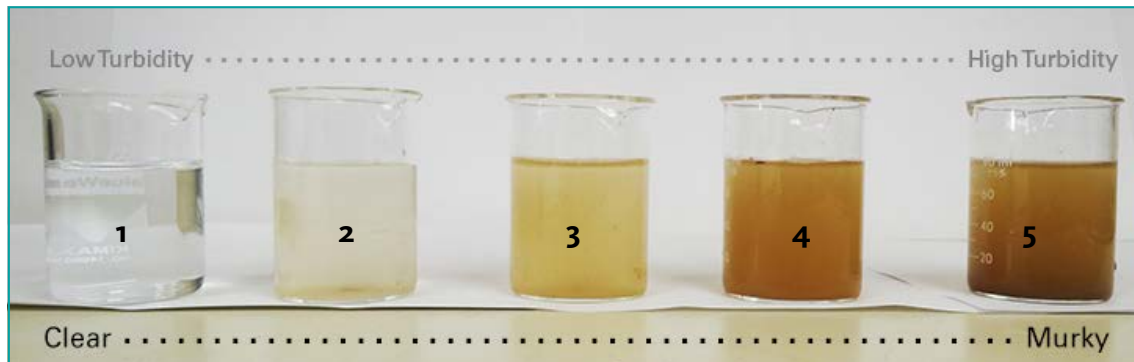


Figure 7 Water turbidity level reference picture.

The speed or flow of water is measured by following the steps below:

1. An item that can float on top of the water is chosen from the river surroundings,
2. Two people stand on each side of the river length,
3. Person A lets go of the item in the water as person B starts a timer,
4. When the item arrives at person B, they stop the timer.

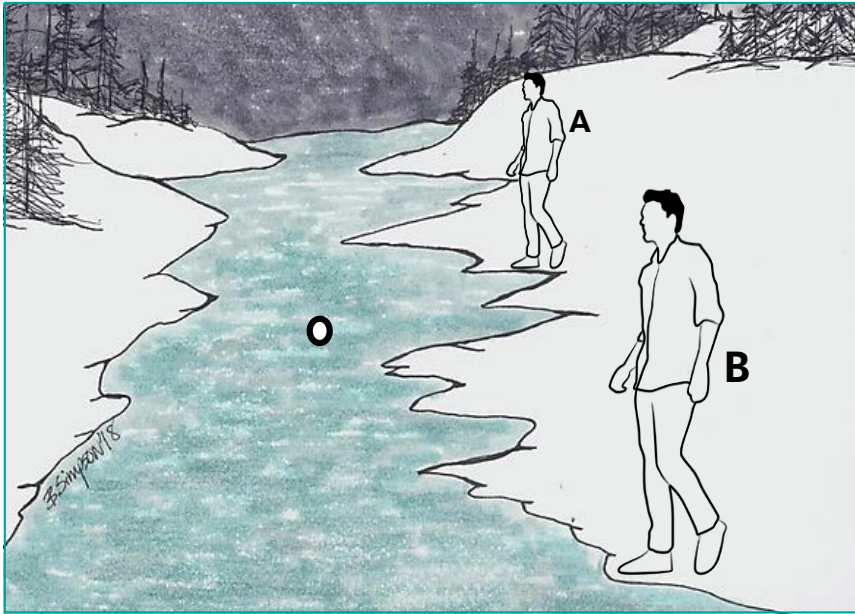


Figure 8 Visual aid diagram of water flow measurement method.

Water flow is measured using the three following values:

- Riverbed width in meters,
- Distance travelled by a floating object placed in the water in meters,
- Time it takes for the object to travel the distance in seconds.

The condition of riverine ecosystems should be assessed about four times a year, once every three months, to keep track of the change in these conditions throughout the seasons.

Needed material for assessment of riverine ecosystem conditions:

- Wristwatch and cellphone,
- Pencil,
- Field templates and guiding material,
- String or other measurement device.

Riverine Ecosystem Field Template

General Information

Name		Weather conditions	<i>rainy, windy, sunny, cloudy...</i>
Date		Site name	
Time		Point name	

Riverine Ecosystems

Water turbidity	<i>1 to 5</i>	<i>water flow test</i>	Distance travelled	
Presence of fish	<i>yes/no</i>		Duration of travel	
Presence of rubbish	<i>yes/no</i>		River width	

Type of rubbish found

<input type="checkbox"/>	Dead animals
<input type="checkbox"/>	Plastic
<input type="checkbox"/>	Metal
<input type="checkbox"/>	Other

Other Fauna Records

General fauna surveys are less structured than bird counts. Citizen scientists are given access to the SPNL QuickTrack mobile application to upload biodiversity observations in their day-to-day lives: pastoral and farm work in the Himas and surrounding village, nature hikes and outings, camping activities, area management actions...

Stakeholders concerned by fauna records and ways to engage them:

- Communities of place: motivated by Homat al Hima trainings and awareness campaigns on the importance of fauna biodiversity,
- Birdwatchers: through communication with local organizers of birdwatching and nature outings,
- Farmers and pastoralists: through awareness campaigns on how fauna biodiversity can aid them with their work,
- Hikers and guides: through communication with local guides (they can ask any hikers to participate),
- Municipality personnel: through briefing on the importance of fauna biodiversity to the functioning of the established Hima,
- Protected area managers: staff or rangers working closely in the field,
- Photographers: through communication with local organizers of birdwatching and nature outings,
- General public: motivated by Homat al Hima trainings and awareness campaigns on the importance of fauna biodiversity.

An ideal fauna observation is backed up by photographic proof. However, this is not necessary, and all citizen scientists need to do for this part is to always be ready to report back into their mobile application what animals they saw and/or heard in and around their village.

Data collected from citizen scientists applying methods of this technical guide will be used in data analysis and visualization work useful for future decision-making and evaluation of human impact on biodiversity.

Examples of data analysis and visualization ideas include:

- Mapping of the presence and absence of priority mammal species in all surveyed Himas,
- Creating diagrams comparing the numbers of migratory and residential birds in surveyed Himas,
- Generating maps comparing endemism rates of the surveyed Himas in terms of flora species.

This technical guide was put together using the recommendations from the Manual for Citizen Science Biodiversity Monitoring in Lebanon. It will be implemented in the context of a one-year trial period and any needed adjustments will be applied with consideration for inputs from experts, participating citizen scientists, communities of Himas, etc.



Biodiversity Monitoring with the engagement of the local community

Credits

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