bio blitz wetlands Philippines

scpw society for the conservation of Philippine wetlands

Ramsar

NEF

Active, Clean and Bountiful Rivers

The Wetlands BioBlitz Project:

A Guide to Conducting a Wetlands BioBlitz Activity

Editors

Aaron Julius M. Lecciones

Amy M. Lecciones

Contributors

Curriculum Development

Ivy Amor F. Lambio (Flora)

Cristian C. Lucañas (Entomofauna)

Simplicia A. Pasicolan (Macrofauna/Avifauna)

Ma. Kristina Orpia (Macrofauna/Avifauna)

Jamella de Castro ((Macrofauna/Avifauna)

Timothy Dizon (Hydrology)

Cynthia Marquea (Water Quality)

Zoisane Gabinete (RAWES)

Jonathan Nicolas (Aquatic microfauna)

Photography

Carlo H. Quintos

Graphics and Layout

Aaron Julius M. Lecciones

Acknowledgements for their invaluable support to the activity

BMB (Jayson N. Pujeda, Kelvin Anthony Balaquit, Joyce Se, Jeffrey Mesias)

LLDA (Darlene T. San Diego, Rosemary R. Cabrera, Bileynnie Encarnacion)

ERDB (Marcgell Adrian Bumanglag, Veronica Mercado, Fe S. Ociones, Pierre Balite)

RBCO (Aldous John A. Abayari, Kate Arenga)

This booklet is intended to guide the conduct of the Wetlands BioBlitz which is being spearheaded by the Society for the Conservation of Philippine Wetlands, Inc. It was developed and tested as part of SCPW's flagship program "Active, Clean and Bountiful Rivers: The Wetlands BioBlitz" with support from the Nagao Wetland Fund and the Ramsar Secretariat.

Contents

Wetlands Bioblitz at Pangil, Laguna

INTRODUCTION

'Bio' in Greek means 'life' and 'Blitz' means 'to do something quickly and intensively'. By doing these together, a 'BioBlitz', one does a collaborative race against the clock to discover as many species of plants, animals and fungi as possible, within a set location, over a defined time period, usually 24 hours[i].

The SCPW modified the BioBlitz concept for wetlands and called it the "Wetlands BioBlitz" or WeBB. Modifications included adding dimensions to the BioBlitz activity that characterize wetlands including geographical info rmation and climate-related and ecosystem services following the Ramsar Information Sheet or the locally adopted Wetland Information Sheet. Among the specific outputs of this Wetland Bioblitz include a Rapid Assessment on Wetland Ecosystems Services (RAWES), data on water quality; hydrology; fauna, avifauna, entomofauna and flora.

The context of the Wetland Bioblitz is to gather various stakeholders and sectors in the community, to work together in an informal and fun way to create a profile of the variety of living and non-living attributes of the ecosystem in a wetland area. It provides an opportunity for participants to learn together and share their expertise and enthusiasm for nature, particularly wetlands. This is a great and fun way of breaking down barriers to engagement with science and raising awareness on the role of biological and physico-chemical recording in wetland ecosystems. It also gives the local community an opportunity to contribute to a genuine scientific survey.

The CLEAR Youth Network through the SCPW will work with research and academic institutions, scientist and other volunteers to operationalize the program. The Wetlands BioBltz will facilitate characterization and monitoring of the improvement of rivers that are included in the program.

The Wetlands BioBlitz Project

The Wetlands BioBlitz Project intends to operationalize a citizen-science-based activity starting with three pilot rivers in the Laguna de Bay Region and address the three-pronged objectives of (1) increasing awareness of local communities; (2) generating scientific information to inform rehabilitation and conservation efforts, and (3) increasing capacity of local communities to embark on wetland conservation activities. It tested and employed a set of methodologies for characterizing and assessing rivers based on the BioBlitz approach and the relevant guidelines, such as the RAWES, from the Ramsar Convention.

The Wetland BioBlitz is a 3-day activity that was implemented in the pilot rivers spearheaded by the Youth participants with the guidance of scientists and other experts. The curriculum includes a Learning Session about wetlands, its importance and the current efforts to conserve them; an orientation seminar on the methods to be used in the field activity; actual field work which ideally should be implemented for 24 hours; data consolidation and processing; visioning and action planning; and a presentation to the local government executives, school officials, and other partners. Agreements on how to proceed with the rehabilitation of the river are also discussed and included in the Action Plan. A website was created where stakeholders can upload and store data from the WeBB activity and for stakeholders and the public to access the WeBB information.

The Wetlands BioBlitz was implemented in three rivers: the Pangil, Pagsanjan-Lumban and Mabitac rivers that flow into Laguna de Bay. Laguna de Bay is the largest inland wetland in the country with a surface area of about 90,000 square kilometres. Approximately 100 rivers and streams drain into the lake, of which 22 are significant river systems. The Laguna de Bay Region covers the National Capital Region of Metro Manila and five neighbouring provinces of Laguna, Rizal, Batangas, Cavite, and Quezon, with a total population of 16.2 Million. Approximately 5 million are within lakeshore areas. Laguna de Bay is largely an urban lake but the East Bay area where the pilot rivers are located is still relatively rural. The lake is used for fisheries (aquaculture and artisanal), power generation, agriculture, floodwater reservoir, domestic water supply, and to a limited extent, recreation. Monitoring of river tributaries in 39 stations yielded results that these waters have mostly deteriorated from Class C, fit for fisheries. to Class D, fit for navigation[ii].

The Active, Clean and Bountiful Rivers is one of the flagship programs of the SCPW and hopefully will be replicated in other wetlands in the country, particularly those with little data

and information at present. The Action Plans that will be crafted during the visioning and planning session will be turned-over to the Local Government Units and the River Basin Councils in the Laguna de Bay to be used as inputs in the rehabilitation of the pilot rivers. The Youth group will continue to monitor the rivers and upload the results in the website of the project. The SCPW will maintain the website and continue sharing the information to those who will need them.

---

[i] Robinson, L. D., Tweddle, J. C., Postles, M. C., West, S. E. and Sewell, J. (2013). Guide to Running a BioBlitz 2.0. Natural History Museum, Bristol Natural History Consortium, Stockholm Environment Institute York and Marine Biological Association. URL: https://www.bnhc.org.uk/communicate/guide-to-running-a-bioblitz-2-0/

[ii] See Laguna Lake Development Authority (LLDA) website at http://www.llda.gov.ph/dox/factsandfigures/qff.jpg. Retrieved 26 March 2018.

PROJECT ACTIVITIES

The major activities of the project are the following:

Preparing for the conduct of the Wetlands BioBlitz

a. Preparatory meetings and workshops:

- ✓ Coordination meetings with schools and Local Government Units, local organisations, and other partners to make arrangements for the venue, meals, accommodation, local transportation, and recruitment of volunteers, among others.
- ✓ Inception meetings with partners to set tasking, timetables, and other matters.

b. Designing the learning session curriculum and preparing a guide to Wetlands BioBlitz

- ✓ Workshop with experts, resource persons and the SCPW Scientific Committee.

Conducting a Wetlands BioBlitz:

The Wetland BioBlitz is a 3-day activity that is implemented in rivers and is spearheaded by youth participants with guidance from scientists and other experts. Three days of WeBB activities are organized to achieve the WeBB objectives of increasing awareness of the wise use of wetlands and the capacity of stakeholders to implement measures for the wise use of wetlands and generating scientific data on rivers. See Annex A for a typical program of a Wetlands BioBlitz.

Day One

The morning session of Day 1 is a Learning Session about wetlands in general, its importance and current efforts to conserve them. This is usually conducted by lecture with an audio-visual aid such as videos produced by the Ramsar Secretariat. Another resource person gives a talk on the specific river that is being characterized and assessed. In the early afternoon session, the experts and scientists conduct an orientation seminar on the methods to be used in the field as well as safety tips to be observed. In the mid-afternoon, field work starts with at least five teams namely: (1) Flora and Fungi; (2) Macrofauna including Avifauna; (3) Invertebrates; (4) Hydrology; and (5) Ecosystem Services. The fieldwork is intended to continue for 24 hours, however, depending on the ability to ensure the safety and security of the participants during the activity, a decision on the length of the field work should be done on a case-to-case basis.

Day Two

Field work continues on Day 2 until mid-afternoon after which data consolidation and processing will start until the session for the day ends.

Day Three

Day 3 will be presentation of results followed by Visioning and Action Planning session until lunchtime. The draft Action Plan will be presented in the afternoon in the presence of the Local Government Executives, school officials, and other partners. Agreements on how to proceed with the rehabilitation of the river will be discussed and included in the Action Plan.

Creating a website for the project to enable accessible data storage and uploading of data and information by stakeholders.

The URL for the website is www.wetlandsbioblitz.org.

The Wetland BioBlitz Primer can be downloaded in this website (See Annex B for WeBB online instructions).

FIELD ACTIVITY: METHODS AND PROCESSES

A. Flora Assessment

For plants, vegetation analysis methods can be employed to document how many species are present (species richness), how many of each kind are there (species abundance) and how does it affect diversity in general. Some of the simple methods that BioBlitzers can do are the following:

Line intercept method - this method basically uses a transect, and the researchers measure the cover of each plant along the transect.

Materials Needed

- Transect line with markings (30 meters)
- Ruler or meter stick
- Guidebooks
- Camera

Methodology

1) A transect line is laid out along the area the researcher wants to analyse, usually on undisturbed vegetation. For this activity, a 30m transect will be laid per designated segment of assessment parallel to the stream.
2) Next, identify all the plant species that touch the transect line. The line can be lowered close to the ground and raised up to the height of the tallest species.
3) Record the names of the plant species. Scientific names are preferred over common names. Photos can be taken to document the species present. Guidebooks and other references will be provided to help identify the plants while small fertile (with flowers or fruits) branches can be collected for later identification by a plant expert.
4) Measure the horizontal cover of a plant species, by means of a ruler or meter stick. Measure (in cm) length subtended by the canopy of the individuals of the species. This length represents the space accessed by the modules of individuals of the species and is the cover of the individuals of the species.
5) Record the length opposite the name of the species.
6) Repeat step 4 for all individuals of the species along the transect line. The sum of all these measurements constitutes the total intercept length of the species.
7) The transect line should be lowered closer to the ground to include short-statured species in the measurement.
8) Repeat steps 4 – 7 for all individuals of all other species along the transect line.
9) Take photos of all the species found in the transect and upload in the Wetlands BioBlitz Website (www.wetlandsbioblitz.org).

The figure below serves as an example.

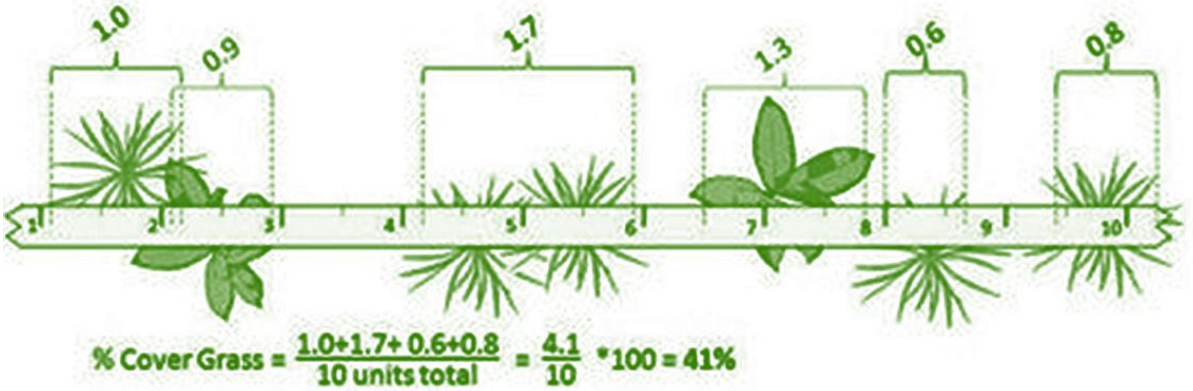

FIGURE 1. SAMPLING VEGETATION USING LINE INTERCEPT METHOD

Quadrat Method - this method uses a transect belt to confine a set area where the researchers must count the number of plants inside:

Materials needed:

- Transect belt
- Field Notebook
- Guidebooks
- Camera

Methodology

1) Set a perimeter with known dimensions around the sampling area (ex. 10mx10m).
2) The sizes most often used are:
    a. 0.01-0.25sq. m - bryophyte, lichens, and algae
    b. 0.25-16 sq. m - grassland, tall herb, short shrub or aquatic macrophyte
    c. 25-100 sq. m - tall shrub community 400 - 2500 sq. m – trees
3) Identify all the plant species that can be found within the area.
4) Record the names of the plant species. Like the line intercept method, scientific names are preferred over common names. Photos can be taken to document the species present. Guidebooks and other references will be provided to help you identify the plants while small fertile branches (with flowers or fruits) can be collected for later identification by a plant expert.
5) Count the number of individuals of each species.
6) Take photos of all plant species found within the area and upload to the Wetlands BioBlitz Website (www.wetlandsbioblitz.org).

When conducting vegetation analysis, one must also collect some physical data of the environment to be used later to help interpret the data obtained from the vegetation analysis. Some physical parameters to be considered are light intensity, relative humidity, air and soil temperature, slope of terrain, wind velocity, and soil pH. it is also good to know the exact coordinates of the sampling site so that one can go back to the same site to conduct future studies that involve changes in

vegetation due to a changing environment.

For these parameters to be gathered, special instruments like light meters, whirling psychrometers, thermometers, anemometers, pH meters and a Global Positioning System (GPS) device can be used.

A changing environment is not only manifested in a shift in vegetation, but on variations in abundance of different organisms. Animals are also good indicators of a changing climate because of their specific tolerance to certain environmental conditions. If the conditions change, these organisms will most likely migrate or worse, might be go extinct.

While conducting the vegetation analysis method, take note of the animals that frequent the sampling site. Make a list of these organisms in a field notebook. If the BioBlitzer is not familiar with the organism, collect some samples to compare with field guides and museum specimens later. Take note to collect only minimal samples and avoid capturing those that have eggs or young ones to tend to.

After the field work portion, species richness and abundance shall be determined, and later, the quantification of plant species diversity of the sampling site. The following datasheet is useful to organise the information to be recorded in a Line Intercept Method.

TABLE 1. DATASHEET FOR THE LINE INTERCEPT METHOD

Data Sheet: Line Intercept Method

Species	Intercept Length (cm)	Relative Cover, pi
Total		1.0000

Species Richness = _____ Species Diversity = _____

Data Sheet: Quadrat Method

Species	Frequency	Relative Frequency, pi
Total		1.0000

Species Richness = _____ Species Diversity = _____

Data Sheet: Physical Parameters of Environment

Criteria	Replicate 1	Replicate 2	Replicate 3	Mean
Light Intensity, lux				
Air Temperature, °C				
Soil Temperature , °C				
Relative Humidity				
Wind velocity				
soil pH				
GPS Coordinates				

Data Sheet: Other organisms seen in sampling area

Organism observed	Abundance

Wetlands Bioblitz at Pangil, Laguna

B. Avifauna Assessment

Materials Needed

- Binocular
- Field Notebook
- Bird Guidebook

Methodology

1) Leveling off in terms of understanding about birds.
2) Discuss techniques on bird identification, importance of birds, and do's and don'ts during birding activities.
3) Using the location map and contour map, lay-out transects by considering the elevation and ecosystem, of the site.
4) Record the time and weather condition of the area.
5) Transverse transect by foot within 15 minutes for every 250 meters at 30 minutes interval early in the morning or late afternoon.
6) Record all the birds sighted and hear in the field notebook.
7) Take photos of the birds and upload in the Wetlands BioBlitz Website (www.wetlandsbioblitz.org).

C. Aquatic Fauna and Flora Assessment

Materials Needed

- Improvised sampler made of mosquito net with collecting tube (Surber Sampler)
- Basin
- Dipper
- Brush (soft bristles)
- Stick (approx. 1 ft long)
- Reference
- Field Notebook
- Sieve (mesh #80), Petri dish, dissecting needle, forceps, stereo zoom microscope

Methodology

1) Position sampler securely on the stream bottom parallel to water flow with the net portion downstream; avoid disturbing the substrate upstream from the sampler and leave no gaps under the edges of the frame that would allow water to wash under the net.
2) When sampler is in place, carefully turn over and gently hand-rub all rocks and large stones inside the frame to dislodge organisms clinging to them or collect the large stones in the basin.
3) Examine each stone carefully for organisms clinging to it before discarding.
4) Collect attached organisms by scraping them from the stones inside the Surber sampler or inside the basin.
5) Stir remaining gravel and sand with the hands or a stick to dislodge bottom-dwelling organisms.
6) Hand-pick some snails, mussels, etc. that are carried into the net by the current.

7) Remove sample by inverting net into sample container or to the basin.

8) Examine net for small organisms and include in the sample collected.

9) Place collected sample into the basin for identification of macroscopic organisms. Filter the remaining content of the sample (sand, mud, etc.) using a sieve and place it on a petri dish. Use the stereo zoom microscope for identifications of microscopic organisms.

10) List down all organisms collected in your field notebook.

11) Take photos of the samples especially those that still need identification.

12) Upload photos to the Wetlands BioBlitz Website (www.wetlandsbioblitz.org).

D. Entomofauna Survey

Materials Needed

- Pen
- Paper/Field Notebook
- Sweeping Net
- Camera

Methodology

Transect and point sampling

1) Follow a predetermined sampling path and record the presence of all organisms that are to be counted within a fixed distance (i.e., 1 m, 5 m) on either side of a specified length of travel along the transect.

2) Report the data as the number of organisms per unit of ground surface. This is calculated as length traveled along the transect times lateral distance examined (i.e., If someone traveled 100 m along a transect and counted all ladybugs within 1 m on either side of the transect they would report data as the number per 200 m^2).

3) In point sample technique, fixed sample sites are established and the person making the counts moves from site to site, recording the numbers of organisms observed during a predetermined period of time (i.e., 5 min, 10 min) at each site.

4) It is important that sample sites should be chosen so that all habitat types within the study area are included.

5) These data are reported as the number of organisms per unit observation time (i.e., number of butterflies per 15 min).

6) Take photos of all species found in the sampling area and upload to the Wetlands BioBlitz Website (www.wetlandsbioblitz.org).

***Sweep net sampling*[1]**

A sweep net can be used to collect flying insects including those that inhabit foliage. Several types of nets are available, with standard sizes being either 30.5 cm (12 in) or 38 cm (15 in) diameter. Aerial nets, on the other hand, have an open mesh collection bag and are used mainly to capture flying insects, although they can be swept through light vegetation such as tall grass. Beating nets are made from canvas and are used to sweep through vegetation that could snag and tear a mesh bag. A single back and forth sweep covering a 1500 to 1800 arc is considered as a single sweep. The number of sweeps taken should be recorded so that samples can be quantified as the number of insects per sweep. Collected insects can be identified and counted l live in the net or placed in a container with a piece of paper towel soaked with non-acetone nail polish remover to kill them to facilitate counting.

E. Water Quality Assessment

Materials Needed

- HORIBA multiparameter water quality meter
- Field notebook
- Life vests

Methodology

1) Collection of water samples for physicochemical parameters will be conducted at different designated stations namely upstream, midstream, and downstream.
2) Using a multiparameter water quality meter, the following in-situ variables will be determined: dissolved oxygen, pH, temperature, conductivity, total dissolve solids (TDS), and Turbidity.
3) Three replications will be performed for each parameter.
4) Results of the physicochemical parameters of each section of the river will be compared to the classification standards set by the DENR- EMB.

F. Hydrology

Materials Needed

- Surveyor's tape
- Meter stick or surveying rod
- Float (any small, buoyant object) or stream flow meter
- Stopwatch
- Pen and field notebook

[1] Culin, J. (undated). *Insects Experiments for the Classroom*. Department of Entomology, Soils, and Plant Sciences. Clemson University. Retrieved from http://fermilabnaturalareas.org/assets/insect-sampling-techniques.pdf. See also Collecting Insects – Discover Life (https://www.discoverlife.org/png/collecting_insects.pdf)

- Rope for anchorage
- Tagging materials (masking tape, clips, etc.)
- Safety equipment

Methodology

Stream flow measurement

1. Selecting site for flow measurement
    a. Select for a site to establish a fixed monitoring station throughout the monitoring period.
    b. The channel section must be relatively straight (10-50 metres, depending on the purpose of the measurement) and free from obstructions (e.g. boulders, branches).
    c. Look for flood marks along the riverbanks.
2. Flow measurement using the *Velocity-area method*

    2.1 Area calculation

    a. Tie the rope on both ends of the banks, and above the flood marks or crest of the riverbank. This will serve as the guide for measuring the cross-sectional area. Measure the width using a surveyor's tape.
    b. Divide the width into segments. The number of segments would depend on the measured width. Refer to the table below.

TABLE 2. VELOCITY-AREA METHOD, STREAM WIDTH BY SEGMENT

Width of stream (m)	Number of Segments	Max segment width (m)
Less than 15	15	1.50
15 to 90	15	6.0
90 to 150	15	15.0
Greater than 150	25	-

    c. Dip the meter stick vertically on each of the segments. Record the measurements.
    d. Do the same for the exposed parts of the riverbank. Record their elevations.
    e. Plot the measurements in a graph. Be wary of the location of the points (above and below water line). Calculate the total area covered of the submerged part.

    2.2 Velocity measurement using floats

    a. Set a stream reach. Length would depend on the purpose of the measurement to be done (10-50 metres).
    b. Throw the float before the starting point. Start the watch as the float passes the designated starting point.
    c. Stop the watch as the float passes the end point. Record the travel time.

d. Repeat the process at least five times. Divide the stream reach with the travel time measured to calculate for the velocity.

e. Get the average velocity.

2.3 Velocity measurement using stream flow meter (water current meter)

a. Set up the stream flow meter. Make sure that parts are well-maintained (no visible damage, batteries are installed properly and fully charged, and monitor screens and moving parts are functioning properly).

b. Locate the segments and dip the impeller. Operate the ECU of the stream flow meter. Wait for the signal and read the measurement.

c. Measure the velocity on 20% and 80% of the depth of each segment. Get the average per segment.

d. Plot the average velocities measured and get the main average.

3. Discharge computation

a. Take the measurements (area and average velocity from either float or stream flow meter method). Calculate the discharge using the following equation:

$$\mathbf{Q = AV}$$

Where:

Q	=	discharge	(m^3/s)
A	=	area	(m^2)
V	=	velocity	(m/s)

This would give the discharge or the volume of water that passes through the cross-section of the river per given time.

Wetlands Bioblitz at Pangil, Laguna
Image Copyright Carlo H. Quintos & SCPW, Inc.

G. Rapid Assessment of Wetland Ecosystem Services (RAWES)

Materials Needed:

- Pen
- Paper
- Voice recorder
- Questionnaire

Methodology

1) Ecosystem services should initially be identified and grouped into functional categories based on work of the Millennium Ecosystem Assessment (MA) - namely **provisioning**, **regulating**, **cultural** and **supporting** services (Figure 2). Using this globally recognized list of ecosystem services, it should be possible to adapt it into a checklist of ecosystem services relevant to the local context. Such a checklist will be constructed during the workshop.

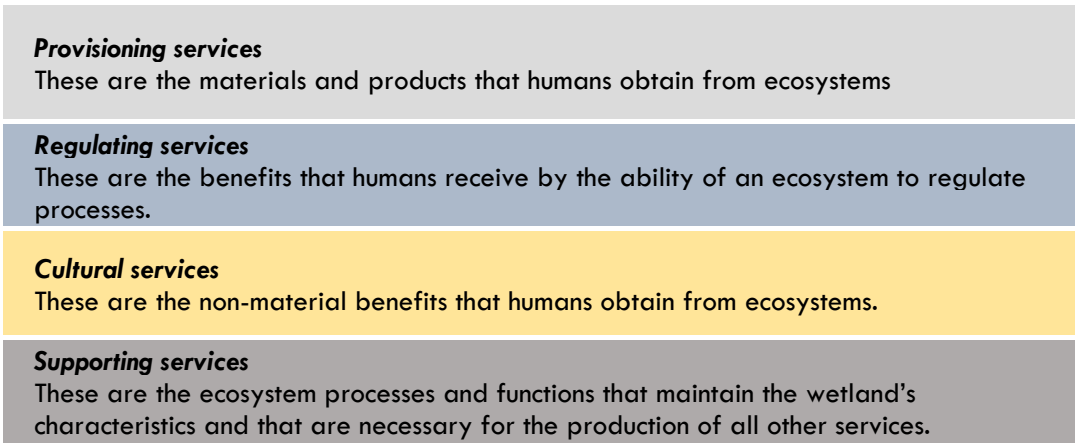

FIGURE 2. ECOSYSTEM SERVICES

2) The assessment of wetland ecosystem services is based on field assessors considering a range of questions and potential outcomes to recognize services and their potential benefits. During the Wetlands BioBlitz, field assessments will be undertaken. The participants should use both their own knowledge of the local wetlands as well as conduct consultation or survey and interviews with local stakeholders and residents.

3) Working in a group, each ecosystem service should be assessed using the following relative scale:

Score Assessment of ecosystem service

++	Significant positive benefit provided
+	Positive benefit
0	Negligible benefit or dis-benefit
-	Negative benefit
--	Significant negative benefit provided
?	Gaps in evidence

All these scores are subjective, and it is accepted that there is scope for subjectivity in assigning relative scores. The objective of this method is to provide an illustrative 'snapshot' of the range of services generated by each wetland surveyed. During the field assessment, use the standardized recording sheet (Table 3) and the sample guide questions () provided in this manual.

TABLE 3. RAWES FIELD ASSESSMENT SHEET

RAPID ASSESSMENT OF WETLAND ECOSYSTEM SERVICES FIELD ASSESSMENT SHEET			
Key	**How important?**	**Wetland name:**	*[Pangil River]*
+ +	Potential significant positive benefit	**GPS co-ordinates**	*[Pangil, Laguna 14°24'11"N and 121°27'58"E]*
+	Potential positive benefit		
0	Negligible benefit	**Date:**	*[September 24-26, 2019]*
-	Potential negative benefit		
- -	Potential significant negative benefit	**Assessors:**	*[RAWES Group in Wetlands BioBlitz Event]*
?	Gaps in evidence		

Provisioning services	**Services**	**How important?**	**Describe benefit**	**Scale of benefit**		
				Local	**Regional**	**Global**
	Fresh water					
	Food					
	Fuel					
	Fibre					
	Genetic resources					
	Natural medicines or pharmaceuticals					
	Ornamental resources					
	Clay, mineral, aggregate harvesting					
	Waste disposal					
	Energy harvesting from natural air and water flows					
Regulatory Services	Air quality regulation					
	Local climate regulation					
	Global climate regulation					
	Water regulation					
	Flood hazard regulation					
	Storm hazard regulation					
	Pest regulation					

	Disease regulation - human					
	Disease regulation - livestock					
	Erosion regulation					
	Water purification					
	Pollination					
	Salinity regulation					
	Fire regulation					
	Noise and visual buffering					
Cultural Services Supporting Services	Cultural heritage					
	Recreation and tourism					
	Aesthetic value					
	Spiritual and religious value					
	Inspiration value					
	Social relations					
	Educational and research					
	Soil formation					
	Primary production					
	Nutrient cycling					
	Water recycling					
	Provision of habitat					

	Ecosystem service	Example	What questions could assessors ask about this service?
Provisioning services	Provision of fresh water	Water used for domestic drinking supply, for irrigation, for livestock, etc.	• Does the wetland provide a source of fresh water? • Does the wetland store fresh water for human use? • Is the wetland a net source of pollution, degrading fresh water provision?
	Provision of food	Crops, fruit, fish, etc.	• What is grown in the wetland, either formally or from informal harvesting? • Are animals are harvested from the wetland? • Are livestock using the wetland?
	Provision of fibre	Timber for building, wool for clothing, etc.	• Are any natural materials such as wood, fibre, straw, animal fibre (wool/hide/sinew/antler/other) taken from the wetland?
	Provision of fuel	Fuelwood, peat, etc.	• Is any material taken from the wetland and used as fuel for domestic or other uses?
	Provision of genetic resources	Rare breeds used for crop/stock breeding, etc.	• Are any native or rare strains of plants and animals, wild and domesticated, which could contribute genetic diversity for human uses (for instance for drug manufacture, improving resilience of domestic animals and plants, horticultural trade, etc.)
	Provision of natural medicines and pharmaceuticals	Plants used as traditional medicines, etc.	• Are there any plants, animals or their parts derived from the wetland which are harvested and used for their medicinal properties?
	Provision of ornamental resources	Collection of shells, flowers, etc.	• Are there any plants, animals or their parts are derived from wetland that are collected and used/sold for their ornamental properties?
	Clay, mineral, aggregate harvesting	Sand and gravel extracted for building use, clay extracted for brick-making, etc.	• What substances are extracted or dug up from the wetland for construction or other human uses?
	Waste disposal	Dumping of solid waste, discharge of waste water, etc.	• Does the wetland provide a location for the disposal of liquid, solid or other waste materials?
	Energy harvesting from natural air and water flows	Water wheels driven by flowing water, windmills driven by the wind, etc.	• Are any technologies (water wheels, wind turbines, etc.) used to capture natural flows of energy through or across the wetland?

	Ecosystem service	Example	What questions could assessors ask about this service?
Regulating services	Pollination	Pollination of plants and crops by pollinators such as bees, butterflies, wasps, etc.	• Do populations of pollinating organisms (butterflies, wasps, bees, bats, etc.) in the wetland contribute to pollination within the wetland? • Do pollinators using the wetland also help to pollinate nearby crops, gardens, allotments, etc.?
	Salinity regulation	Freshwater in the wetland provides a barrier to saline waters.	• Does the hydrology of the wetland help prevent saline water contaminating freshwaters? • Doe the presence of freshwater in the wetland prevent the salinisation of soils?
	Fire regulation	Providing physical barriers to the spread of fire, maintaining wet conditions to prevent fires spreading, etc.	• Does the configuration of waterbodies (ditches, streams, etc.) help to prevent the spread of fires? • Is there water at or near the soil surface that restricts the spread of fire? • Are organic rich or peat soils drained and susceptible to fire and burning?
	Noise and visual buffering	Wetland trees or tall reeds absorbing and buffering the impact of noise.	• Is there a source (busy road, industry, construction, etc.) and receptor (houses, wildlife, etc.) for noise pollution? • Does wetland ecosystem structure, particularly tall trees and reeds, provide visual screening as well as suppress noise transmission?

	Ecosystem service	Example	What questions could assessors ask about this service?
Regulating services	Air quality regulation	Removal of airborne particles from the exhaust of cars, chimneys of industry, dust from agricultural land, etc.	• Is there a source for airborne pollutants? • Does the wetland habitat structure help to settle out airborne pollutants? • Does the state of the wetland make it a source of air pollutants (microbial, particulate or chemical)?
	Local climate regulation	Regulation of the local microclimate, through shading, reducing air temperature, etc.	• Does the wetland habitat structure provide shade for humans? • Does the wetland have areas of standing water with or without vegetation that will be generating evapotranspiration and consequently reducing air temperatures?
	Global climate regulation	Regulation of the global climate through control in greenhouse gas emissions, the sequestration of carbon, etc.	• Does the wetland store and/or sequester carbon? • Does this balance with generation of methane and other greenhouse gases?
	Water regulation	Regulation of flows of surface water during high and low flows, regulation of recharge of groundwater, etc.	• Do the topography, permeability and roughness of the wetland enable it to store water during high rainfall/discharge and top slowly release it back to surface waters or to groundwater? • Does the wetland regulate discharges during dry periods to buffer low flows during dry weather?
	Flood hazard regulation	Regulation and storage of flood water, regulation of intense rainfall events, etc.	• Does the wetland regulate, store and retain floodwaters? • Does the wetland store rainfall and surface water that might contribute to flooding and damage to property or ecosystems downstream?
	Storm hazard regulation	Regulation of tidal or storm surges, regulation of extreme winds, etc.	• Does the complexity of habitat, particularly trees, tall reeds and other vegetation and surface topography, absorb energy from extreme events such as storms and waves that might otherwise damage property or adjacent ecosystems?
	Pest regulation	Control of pest species such as mosquitoes, rats, flies, etc.	• Do natural predation and other ecological processes in the wetland regulate and control pest organisms? • Is the wetland a source of pests (for example rats thriving in dirty water systems)?
	Regulation of human diseases	Presence of species that control the species (vectors) that transmit human diseases such as malaria, West Nile fever, dengue fever, Zika virus, leptospirosis, schistosomiasis, etc.	• Do natural predation and other ecological processes in the wetland regulate organisms that may cause human diseases? • Are faecal deposits, bacteria or other potentially pathogenic microbes immobilised by processes in the wetland? • Is the condition of the wetland contributing to the negative spread of populations of disease vectors (such as mosquitoes)?
	Regulation of diseases affecting livestock	Presence of species that control the species (vectors) that transmit diseases to livestock such as leptospirosis, schistosomiasis, duck virus enteritis, highly pathogenic avian influenza, tick-borne diseases, etc.	• Do natural predation and other ecological processes in the wetland regulate organisms that may cause diseases in livestock? • Are faecal deposits, bacteria or other potentially pathogenic microbes immobilised by processes in the wetland? • Is the condition of the wetland contributing to the negative spread of populations of disease vectors (such as mosquitoes or snails)?
	Erosion regulation	Regulation of energy environment to reduce risk of erosion, presence of dense vegetation protecting soils, etc.	• Does the wetland vegetation provide protection from erosion for the soils? • Are there any signs of erosion, such as bare earth, in the wetland?
	Water purification	Cleaning of water, improvement of water quality, deposition of silts, trapping of contaminants and pollutants, etc.	• Do physico-chemical (sunlight exposure in shallow waters, detention of water in aerobic and anaerobic microhabitats) and biological processes in the wetland result in the breakdown of organic, microbial and other pollutants in the water passing though? • Is there a noticeable change in the quality, such as the turbidity, of water entering and leaving the wetland?

	Ecosystem service	Example	What questions could assessors ask about this service?
Cultural services	Cultural heritage	Importance of the wetland for historical or archaeological value, as an example of traditional uses or management practices, as a cultural landscape, etc.	• Does the wetland system have cultural importance, either due to its natural character or traditional uses?
	Recreation and tourism	Importance of the wetland for providing a location for recreation such as fishing, watersports or swimming, or as a tourism destination, etc.	• Is the wetland used for organised or informal recreational purposes? • Are their wider tourism/ecotourism benefits flowing from these uses?
	Aesthetic value	The wetland is overlooked by properties, is part of an of known area of natural beauty, is used as a subject for painters and artists, etc.	• Does the wetland provide aesthetic benefits through the desirability of siting houses of commercial development adjacent to it? • Does the presence of a wetland have a significant impact on property prices? • Is the wetland depicted in may works of art?
	Spiritual and religious value	The wetland holds plays a role in local religious festivals, the wetland is considered as a sacred site, the wetland forms part of a traditional belief system, etc.	• What spiritual and/or religious values do people derive from the wetland? • Does the wetland hold any important spiritual or cultural value to people? • Does the wetland play any part in traditional religious ceremonies? • Are there any traditional wetland management practices (such as the timing of planting and cropping of rice to Buddhist or other traditions and teachings) associated with the wetland?
	Inspirational value	Presence of local myths or stories relating to the wetland, traditional oral or written histories about the wetland or wetland animals, creation of different art forms associated with the wetland, development of distinct architecture based on the wetland, etc.	• Are there any particular myths or other folklore associated with the wetland? • Do any wetland animals appear or are featured in local stories and myths? • Does the wetland inspire people to create music or other forms of art? • Have particularly ways of designing and building developed which reflect the wetland?
	Social relations	Presence of fishing, grazing or cropping communities which have developed within and around the wetland.	• Have communities formed around the wetland and its uses, including for example fishing (subsistence, commercial and recreational), cropping or stock management, walking and jogging, birdwatching and photography, etc?
	Educational and research	Use of the wetland by local school children for education, site of long-term research and monitoring, site visited by educational tours	• Is the wetland used for any educational purposes, organised or informal, ranging from school-level visits to university research and teaching?

	Ecosystem service	Example	What questions could assessors ask about this service?
Supporting services	Soil formation	Deposition of sediment, accumulation of organic matter, etc.	• Do accretion processes (both sedimentation of mineral material and the build up of organic material) on the wetland result in the formation of soils?
	Primary production	Presence of primary producers such as plants, algae, etc.	• Do photosynthetic processes on the wetland produce organic matter and store energy in biochemical form?
	Nutrient cycling	Source of nutrients present from inputs from agricultural land, internal cycling of plant material, inputs of nutrients from floodwaters, presence of fauna to recycling nutrients, etc.	• Do wetland processes biochemically transform nutrients (for example nitrification/denitrification)? • Are nutrients settled out in particulate forms, changing the characteristics of water passing through the system? • Are there abundant invertebrates and detritivores that are decomposing and cycling organic material?
	Water recycling	Presence of wetland vegetation and open water result in evapotranspiration and local recycling of water, relatively closed canopies and low exposure to winds retains water in local cycles, sandy or coarse substrates allow exchange with groundwaters, etc.	• Does the structure of the wetland retain water in tight cycles (for example recapture of vapour produced by evapotranspiration)? • Does the wetland enable exchanges with groundwater (either discharge or recharge)?
	Provision of habitat	Presence of locally important habitats and species, presence of species and habitats of conservation concern, etc.	• Does the wetland support a diversity of locally representative biodiversity (plants and animals)? • Does the wetland support species which humans consider of conservation concern or as charismatic interests?

POST-FIELDWORK ACTIVITY

A. Data Processing

After the field work you can now process your data. Begin by organising your photographs and notes. Keep your best photographs and put structure to your notes. You will be given your access credentials to the WeBB Online at www.wetlandsbioblitz.org.

B. Encoding your data

You may encode your data using the WeBB Online by following the instructions laid out step by step found in the WeBB Online Manual V0.5 (See Annex B). It is important that you email post@wetlands.ph that you have registered for access credentials to the WeBB since all access credentials are manually approved. This is to ensure that all users have undergone proper training during a SCPW Wetlands Ecological BioBlitz event.

C. References and Support

If you have any questions, please ask your WeBB Facilitator or you may also contact *Kuya Caloy* (Mr Carlo H. Quintos) at the SCPW Office at +63(2) 86372409 or by email at post@wetlands.ph.

Wetlands Bioblitz at Pangil, Laguna
Image Copyright Carlo H. Quintos & SCPW, Inc.

Annex A

Typical Program of the Wetlands BioBlitz Activity

Time	Activity	Tasking
Day 1		
9:00am	Arrival at Venue, Registration and Refreshments	
9:30am	Opening Program Prayer Philippine National Anthem Welcome and Opening Remarks Messages from Partners	
Photo Opportunity and Break		
9:30 – 11:00am	Learning Session	
	Wetlands 101: What are Wetlands? Why are they important and what are we doing to conserve them?	SCPW
	Profile of Laguna de Bay	LLDA
11:00am – 12:30pm	The Wetlands Bio-Blitz Program Briefing on the BioBlitz Activity, Procedures and Methods	SCPW Breakout Groups
	- Rapid Assessment of Wetland Ecosystem Services (RAWES)	BMB-DENR
	- Water Quality	ERDB-DENR
	- Hydrology	
	- Avifauna	DENR-ERDB
	- Aquatic Flora and Fauna	LLDA
	- Flora	UPLB - IBS
	- Entomology	UPLB-IBS
	- GIS and mapping	RBCO- DENR
	Open Forum	SCPW
12:30 – 1:30pm	Lunch Break	
1:30 – 2:00pm	Briefing on Pangil River Eco-Park, Mr. Raymund Diaz, Park Manager	
2:00 – 4:30pm	Wetland BioBlitz Field Work	
4:30pm	End of Day 1 field data gathering for High School Students	
Note: The scientists and experts with the adult volunteers will continue field work on a 24-hour basis depending on the security situation of the site.		
Day 2		
9:00am 9:30am – 2:00pm (With lunch break from 12:00 – 1:00pm)	Registration and refreshments Field Work (continuation)	HS Students and Coordinators, Scientist and Volunteers
2:00 – 4:00pm	Data consolidation and preparation of presentations	HS Students and Coordinators, Scientist and Volunteers
4:00-4:30pm	Presentation of results	HS Students and Coordinators, Scientist and Volunteers
4:30pm	End of Session for Day 2	
Day 3		
8:30am	Registration	
8:45-9:15am	Briefing on the Wetlands BioBlitz Website	SCPW
9:15 – 10:15am	Action Planning and Next Steps	SCPW
10:15 – 10:30am	AM Break	
10:30am-11:00am	Team Meeting (to feedback on the approach, methods, actual conduct of activity)	SCPW and experts
11:00 – 12:00 pm	Closing and Awarding Ceremonies	SCPW, Principal, LGU Official
12:00 – 1:00pm	Lunch	
	Homeward Bound	

Annex B

SCPW WeBB Online Instructions

Please refer to instructions found at the following link:

https://www.wetlands.ph/knowledge-resources/

Look for the section “SCPW Wetlands Ecological BioBlitz”.

p

Source links to open source graphics used in the manual

- http://pngimg.com/download/1160
- http://www.vecteezy.com/insects-bugs/48526-ladybug-vector
- https://openclipart.org/detail/7020/seaweed
- http://pngimg.com/download/10856