

Environmental Science

A 90-hour field internship for undergraduate students, delivered in four stages: recorded lectures, an online assessment, geotagged field work, and a marked report. 6 modules, 5 of them in the field.

01	Reading the Floodplain: Ecosystems, Biodiversity and Environmental Law	CONCEPTUAL
02	Biodiversity Survey: The Transect Walk	FIELD
03	Ethnobotany and the People's Biodiversity Register	FIELD
04	Rivers, Ponds and Wetlands: Water Quality in the Field	FIELD
05	Living with Floods: Community Disaster Preparedness	FIELD
06	Waste, Plastics and Green Action	FIELD





River and forest field studies, biodiversity survey, and disaster preparedness on the Ganga floodplain.

ENVIRONMENTAL SCIENCE

Part I: Programme document

1. Why this subject, why now

Bihar is the most flood-exposed state in India. The Water Resources Department of Bihar records that 68,800 of the state's 94,163 square kilometres, 73.06 percent, is flood affected, and that the rivers that flood north Bihar (Kosi, Gandak, Burhi Gandak, Bagmati, Kamla Balan, Mahananda and the Adhwara group) rise in Nepal. The 2008 Kosi breach at Kusaha affected about 3.3 million people in Bihar according to the post-disaster needs assessment. The state also has little forest: the India State of Forest Report 2023 puts Bihar's forest cover at 7,381 square kilometres, 7.84 percent of its area. Its wetlands, oxbow lakes (chaurs and mauns), ahars and pynes, village ponds and the Ganga itself carry most of its biodiversity and most of its water security.

Every undergraduate already sits through the UGC compulsory Environmental Studies core module, a 50-lecture course in which only five hours are field work. Students learn the vocabulary of ecosystems and pollution but rarely walk a transect, test a pond, sit with an elder to record a plant's use, or ask a household what it would do if the embankment breached. This internship supplies that missing practice.

Ethno Medico Agro Botanical Research Society works on the Ganga floodplain at Bakhtiyarpur, documents medicinal plants and their traditional uses, and works alongside forest officers and agricultural scientists of the region. Its field experience shapes the six modules. A student who completes them will have produced a small but real body of environmental evidence about one Bihar locality, in formats that match what the state's own institutions are required to produce: the Biological Diversity Act 2002, amended in 2023, requires every panchayat and municipality to constitute a Biodiversity Management Committee and document local biodiversity in a People's Biodiversity Register; NDMA's Community Based Disaster Risk Reduction guidelines of October 2024 ask for village disaster management committees and household preparedness; the Solid Waste Management Rules 2016 place duties on every waste generator; the single use plastic ban has been in force since 1 July 2022. Each needs trained local hands.



2. Who it is for, and outcomes

Eligible streams. All undergraduate programmes of the partner universities. The internship assumes no laboratory access and no prior ecology training. A Zoology student may identify more species and a Hindi student may write a better elder interview; the rubrics reward both.

Prerequisites. None. A smartphone with camera and location services is needed for the Do stages; a batchmate's phone may be used provided the student appears in the photographs.

Learning outcomes. On completing the 90 hours a student will be able to:

1. Describe the floodplain, wetland, riverine and village agro-forest ecosystems of the middle Ganga basin and name the Indian laws that govern each (Remember, Understand).
2. Walk a fixed transect and record plants and birds using photographs, a field sheet and a citizen science platform, and state the limits of the data (Apply, Analyse).
3. Document medicinal plants and their uses from community elders in People's Biodiversity Register format with prior informed consent (Apply).
4. Carry out a structured visual and simple physical assessment of a river reach or pond and relate it to CPCB designated best use classes (Apply, Analyse).
5. Conduct a household flood preparedness survey, draw a hazard and resource map, and identify gaps against NDMA community guidance (Analyse, Evaluate).
6. Audit the waste stream of a market or campus against the Solid Waste Management Rules 2016 and propose a segregation plan (Analyse, Create).
7. Plan and execute a native species plantation with a school and set up survival monitoring (Create).
8. Write evidence-based reports that separate observation from inference and cite Indian sources (Evaluate, Create).



3. At a glance

MODULE	TITLE	TYPE	HOURS	FIELD TASK IN ONE LINE
1	Reading the Floodplain: Ecosystems, Biodiversity and Environmental Law	Conceptual	15	None (written reflection)
2	Biodiversity Survey: The Transect Walk	Field	15	Walk a 1 km transect and document plants and birds with geotagged photographs
3	Ethnobotany and the People's Biodiversity Register	Field	15	Record 15 to 20 medicinal plants and their uses from village elders in PBR format
4	Rivers, Ponds and Wetlands: Water Quality in the Field	Field	15	Observe a river reach or pond and complete a simple water quality checklist
5	Living with Floods: Community Disaster Preparedness	Field	15	Survey 10 households on flood preparedness and draw a hazard and resource map
6	Waste, Plastics and Green Action	Field	15	Audit the waste of a market or campus, then plant native saplings with a school

Total 90 hours: one conceptual module, five field modules.



4. How the four stages apply to this subject

Learn. Recorded lectures plus written material, using Bihar examples: the Ganga at Patna and Bakhtiyarpur, Kanwar Lake in Begusarai, the Vikramshila Gangetic Dolphin Sanctuary, the Kosi and Gandak embankments, the makhana wetlands of Mithila. A lecture completes at 80 percent watch time.

Test. One MCQ test per module: 20 questions, 25 minutes, single attempt, unlocked after all lectures, questions weighted by lecture hours.

Do. The student proposes a specific site through the portal; the coordinator approves it and the coordinates are stored. Uploaded photographs are checked against them. Every task can be done on foot from home or college with a phone, notebook, string, a measuring tape or marked rope, a white plastic plate and a household thermometer. Optional items (aquarium pH strips, hand lens) are never required for full marks.

Report. Each field module has a report format and rubric. Reports are in English or Hindi, normally 800 to 1,200 words plus tables and sketches, referencing photographs by upload number. Module 1's written reflection replaces Stages 03 and 04.



5. Assessment and grading

Total 100 marks.

COMPONENT	MARKS	DETAIL
MCQ tests (6 modules)	30	5 per module, auto graded
Module 1 written reflection	5	600 to 800 words, 4-criterion rubric
Field evidence (5 modules)	15	3 per module: location verified, required shots present, student visible
Module reports (5 modules)	40	8 per module; each rubric is out of 20 and scaled
Final report	10	Appendix A format, Appendix C rubric

Grade bands. A+ 85 and above; A 75 to 84; B+ 65 to 74; B 55 to 64; C 45 to 54; below 45 Fail.

Passing standard. 45 marks or more overall, field evidence accepted for all five field modules, no test unattempted.

Rejected evidence (wrong location, student absent, required shots missing) may be re-attempted once at a fresh site within the semester. The certificate is QR verifiable and carries the grade.

6. Field work: ethics, safety, permissions

Consent. People are photographed only with spoken consent, recorded in the report ("Consent given by Shri X, resident of Y, on date"). Children at the plantation are photographed only with the school head's permission, in wide shots or with faces turned away. Elders interviewed about plants are told beforehand that the information goes into a student report, will be credited to them unless they prefer otherwise, and will not be used commercially, in the spirit of the access and benefit sharing provisions of the Biological Diversity Act 2002. Households may decline any question; no photographs are taken inside homes; no one recently bereaved or dispossessed by a flood is pressed for an interview.

Safety rules.

- No water body is entered. All observation is from the bank or a ghat step.
- No task during an active flood warning, heavy rain or after dark. Students check district or BSDMA advisories before a monsoon river visit.
- Transects are walked in pairs where possible, in closed shoes and long trousers, with water, watching for snakes in grass and near water from July to October.
- No entry into notified forest without a permit. Village groves, riverbanks, canal bunds, roadsides and campus grounds are the intended habitats.
- Plants are photographed, not collected; nothing is tasted or applied. Reported uses are recorded, never tested.
- Waste is sorted with a stick or gloves, never bare-handed; sanitary and medical waste is counted, not handled.

Who to inform. The mukhiya or ward member (village tasks); the school head (plantation); the market committee or municipal sanitary inspector (market audit); the principal's office (campus tasks); the forest range office if a transect touches notified forest. The portal supplies a letter of introduction from the Society.



7. Final report format

1,500 to 2,000 words plus annexures, written after Module 6, following Appendix A: locality profile, findings from each of the five field modules, cross-cutting analysis, recommendations addressed to a named local institution, and reflection. Module reports are attached as annexures and not re-marked.

8. Skills built and career pathways (India)

Skills: field observation and recording, species identification with digital tools, structured interviewing, participatory mapping, simple water assessment, waste characterisation, plantation planning, evidence-based report writing.

Pathways: Biodiversity Management Committees and the Bihar State Biodiversity Board (Technical Support Groups, PBR enumeration); NDMA's Aapda Mitra community volunteer scheme; the Wildlife Institute of India's Ganga Prahari programme under the National Mission for Clean Ganga, which trains riverside volunteers in Bihar; MoEFCC eco-club facilitation in schools; Swachh Bharat Mission waste and IEC roles in urban local bodies; postgraduate study in environmental science, forestry, disaster management, geography and pharmacognosy; Bihar Forest Service and Indian Forest Service examinations; NGO river and wetland work; extension work with ICAR institutions such as ICAR-RCER Patna and Krishi Vigyan Kendras.



9. Alignment: NEP 2020, UGC internship guidelines, NAAC criteria, SDGs

- **NEP 2020:** experiential learning, community engagement and environmental education across higher education.
- **UGC Guidelines for Internship/Research Internship for Under Graduate Students:** 60 to 120 hours after the fourth semester, 2 to 4 credits, one credit equal to 30 hours. This 90-hour programme sits within that band in Semester V.
- **UGC Environmental Studies core module:** deepens Units 3, 4, 5 and, above all, Unit 8 (field work).
- **NAAC:** Criterion 3 (extension and collaboration), Criterion 5 (student skills), Criterion 7 (environmental consciousness and institutional values).
- **SDGs:** 6 (clean water), 11 (resilient communities, target 11.5), 12 (responsible consumption), 13 (climate action), 15 (life on land).

10. Benchmarks consulted

- 1. UGC Core Module Syllabus for Environmental Studies.** Eight units, 50 lectures; Unit 8 field work equal to five lecture hours; exam Part C carries 25 marks for field work.
https://www.ugc.gov.in/pdfnews/2269552_environmentalstudies.pdf. Adapted: the Unit 8 tasks (document a river or forest, visit a polluted site, study common plants, insects and birds, study a pond or river) are expanded from five hours into four full field modules with evidence and rubrics.
- 2. MoEFCC Environment Education Programme and National Green Corps eco-clubs.** Started 2001-02; the EEP portal lists over a lakh eco-clubs working on greenery and biodiversity, waste, water, energy and sanitation, aligned with Mission LiFE. <https://eepmoefcc.nic.in/>. Adapted: the plantation and waste audit are designed to be handed to a school eco-club as ready activities.
- 3. NDMA Community Based Disaster Risk Reduction Guidelines (October 2024) and NIDM Village Disaster Management Plan training module.** Village committees, hazard, vulnerability and capacity assessment, participatory maps, task forces, drills, Aapda Mitra. https://ndma.gov.in/sites/default/files/PDF/Guidelines/CBDRR_Guidelines_Oct_2024.pdf and <https://nidm.gov.in/PDF/modules/village.pdf>. Adapted: the participatory map and household checklist reduced to what one student can do with ten households in six hours.
- 4. Bihar State Disaster Management Authority flood material.** <https://bsdma.bihar.gov.in/en/flood>. Adapted: the household questionnaire uses the before, during and after framing.
- 5. National Biodiversity Authority PBR guidelines (revised 2013) and the BMC framework under the Biological Diversity Act 2002.** PBRs record local biological resources, uses and traditional knowledge in prescribed formats, prepared by the BMC with a Technical Support Group. <https://www.nbaindia.nic.in/>. Adapted: a simplified five-column medicinal plant sheet a BMC could accept as a starting draft.
- 6. BNHS Conservation Education Centre courses and WWF-India Ek Prithvi.** BNHS runs certificate courses in ornithology, botany, butterflies and biodiversity conservation open to anyone with Class X, now in online-plus-field form; Ek Prithvi runs whole-school environment education



in government schools across eleven states. <https://www.bnhs.org/content-details/mumbai-cec> and https://www.wwfindia.org/about_wwf/environmental_education/ek_prithvi/. Adapted: no-prerequisite entry and walk-based species learning.

7. **iNaturalist in undergraduate courses (Hitchcock, Sullivan and O'Donnell, 2021, Citizen Science: Theory and Practice).** Photo-based geotagged observations, research grade by community identification, permanent campus transects. <https://theoryandpractice.citizenscienceassociation.org/articles/10.5334/cstp.439->. Adapted: the fixed 1 km transect, photograph-first recording, optional upload to iNaturalist and eBird.
8. **State of India's Birds 2023.** Assessment of 942 species from over 30 million eBird observations. <https://stateofindiasbirds.in/>. Adapted: bird recording protocol and the caution about unstructured data.

ENVIRONMENTAL SCIENCE

Part II: Modules



MODULE 1

Reading the Floodplain: Ecosystems, Biodiversity and Environmental Law

CONCEPTUAL

15 HOURS

Overview and learning outcomes

The foundation module. Students learn to see the Ganga floodplain as a system of river, levee, backswamp, oxbow lake, grove, farmland and town, each with its biodiversity, hazards and law. On completion the student can describe the ecosystem types of the middle Ganga basin, use the concepts needed later (habitat, species richness, indicator species, catchment, designated best use, hazard and vulnerability), and name the Act or Rules that apply to forests, wildlife, wetlands, water, biodiversity, waste and disasters.

Hour allocation

Learn 12 hours (lectures 7, reading 5); Test 1 hour; written reflection 2 hours.

STAGE 01 · LEARN

LECTURES

1. **The Ganga floodplain as an ecosystem** (60 min). The annual flood pulse and why floods are ecologically normal; levees, backswamps, oxbow lakes (mauns, chauras), diara land; sediment and Bihar's soils; flood versus flood disaster; where Bakhtiyarpur and the partner districts sit.
2. **Ecosystem basics without a laboratory** (60 min). Producers, consumers, decomposers; the food web of a village pond; succession on a sandbar; keystone and indicator species; genetic, species and ecosystem diversity; why local surveys feed national assessments.
- 3.



Biodiversity of Bihar (60 min). Forest cover 7.84 percent (ISFR 2023) and what grows outside forests; the Gangetic dolphin, national aquatic animal, and the Vikramshila sanctuary between Sultanganj and Kahalgaon; Kanwar Lake (Ramsar 2020), Nagi and Nakti (Ramsar 2024); wetland and migratory birds; makhana and singhara; common trees of village groves.

4. **Law, part one: forests, wildlife, biodiversity** (60 min). Indian Forest Act 1927; Forest (Conservation) Act 1980 and its 2023 amendment; Wild Life (Protection) Act 1972; Biological Diversity Act 2002 and the 2023 amendment; NBA, State Biodiversity Boards, BMCs, PBRs; the Bihar State Biodiversity Board.
5. **Law, part two: water, wetlands, pollution, waste** (60 min). Water (Prevention and Control of Pollution) Act 1974, CPCB and the Bihar State Pollution Control Board; Environment (Protection) Act 1986 as parent of the Rules; Wetlands (Conservation and Management) Rules 2017; Solid Waste Management Rules 2016; Plastic Waste Management Rules and the 1 July 2022 ban; the National Green Tribunal.
6. **Disasters, climate and the law** (60 min). Disaster Management Act 2005 and its 2025 amendment; NDMA, BSDMA, district authorities; hazard, exposure, vulnerability, capacity, risk; transboundary flood risk; heat and drought; the changing monsoon.
7. **Programmes met in the field** (60 min). Namami Gange and NMCG; Jal Jeevan Mission; Bihar's Jal-Jeevan-Hariyali Mission and its restoration of ponds, ahars and pynes; Swachh Bharat Mission; Mission LiFE; Ek Ped Maa Ke Naam (launched 5 June 2024); Aapda Mitra; the eco-club network.

READING MATERIAL

- The floodplain landscape of Bihar (FMISC, Water Resources Department; Bihar State Disaster Management Plan).
- Ecosystem concepts in plain language (UGC core module Units 3 and 4; the UGC textbook by Erach Bharucha).
- Biodiversity of Bihar (ISFR 2023; Ramsar Sites Information Service entries; Wildlife Institute of India on Vikramshila).
- One-page summaries of each Act and Rules in lectures 4 to 6, with citizen-relevant sections (section 41 of the BD Act on BMCs; rule 4 of SWM Rules 2016 on generator duties; section 41A of the DM Act as amended).
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Programme fact sheets from official portals (NMCG, Jal-Jeevan-Hariyali, Aapda Mitra, MoEFCC EEP).

STAGE 02 · TEST

Blueprint: 20 questions, 25 minutes; lectures 1 to 3: 8; lectures 4 to 6: 9; lecture 7: 3. Sample MCQs (correct answer marked with an asterisk):

Q1 Share of Bihar's area that is flood affected, per the Water Resources Department:

- a. 23 percent
- b. 48 percent
- c. 73 percent**
- d. 91 percent

Q2 An oxbow lake forms when:

- a. a dam is built
- b. a meander is cut off from the river**
- c. groundwater rises
- d. an embankment is raised

Q3 A People's Biodiversity Register is prepared by:

- a. the Forest Department
- b. the district collector
- c. the Biodiversity Management Committee**
- d. the Pollution Control Board



Q4 Kanwar Lake became a Ramsar site in:

- a. 2010
- b. 2016
- c. 2020**
- d. 2024

Q5 India's national aquatic animal is:

- a. the gharial
- b. the Gangetic dolphin**
- c. the hilsa
- d. the mahseer

Q6 Three-stream segregation by every waste generator is required by:

- a. Wetlands Rules 2017
- b. Solid Waste Management Rules 2016**
- c. Indian Forest Act 1927
- d. Water Act 1974



Q7 "Vulnerability" means:

- a. the size of a flood
- b. the conditions that make a community susceptible to harm**
- c. the number of boats
- d. rainfall intensity

Q8 The single use plastic ban took effect on:

- a. 2 October 2014
- b. 1 January 2020
- c. 1 July 2022**
- d. 5 June 2024

Q9 The Vikramshila Gangetic Dolphin Sanctuary lies between:

- a. Buxar and Patna
- b. Sultanganj and Kahalgaon**
- c. Munger and Begusarai
- d. Bakhtiyarpur and Mokama

Q10 The apex disaster management body under the 2005 Act is:

- a. NIDM
- b. NDRF
- c. NDMA**
- d. BSDMA

Written reflection (600 to 800 words): "Describe the ecosystems within 5 km of your home, the laws and programmes that touch them, and one environmental problem you could document with a phone and a notebook."

Rubric: ecosystem accuracy (5), correct law or programme (5), specificity of the problem (5), clarity (5); scaled to 5 marks.

Glossary

Floodplain; oxbow lake (maun, chaur); diara; ecosystem; biodiversity; indicator species; catchment; Ramsar site; Biodiversity Management Committee; People's Biodiversity Register; designated best use; hazard, vulnerability, risk.

References

- UGC, Core Module Syllabus for Environmental Studies.
https://www.ugc.gov.in/pdfnews/2269552_environmentalstudies.pdf
- Water Resources Department Bihar, FMISC, History of floods. <https://fmiscwrdbihar.gov.in/fmis/history.html>
- Forest Survey of India, ISFR 2023 (PIB release). <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2086742>
- The Biological Diversity Act 2002.
https://www.indiacode.nic.in/bitstream/123456789/21545/1/the_biological_diversity_act,_2002.pdf
- The Biological Diversity (Amendment) Act 2023. <https://egazette.gov.in/WriteReadData/2023/247815.pdf>



- Wetlands (Conservation and Management) Rules 2017.

<https://moef.gov.in/uploads/2020/01/final-version-and-printed-wetland-guidelines-rules-2017-03.01.20.pdf>

- Disaster Management (Amendment) Act 2025 (PIB).

<https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=2226438>

- Bihar State Biodiversity Board. <https://bsbb.bihar.gov.in/>

- Jal-Jeevan-Hariyali Mission, Government of Bihar. <https://jaljeevanhariyali.bihar.gov.in/>

- Wildlife Institute of India, Vikramshila Gangetic Dolphin Wildlife Sanctuary.

<https://v1.wii.gov.in/nmcg/protected-areas-along-ganga/vikramshila-gangetic-dolphin-wildlife-sanctuary>



MODULE 2

Biodiversity Survey: The Transect Walk

FIELD

15 HOURS

Overview and learning outcomes

Students learn the line transect, the simplest reliable ecological field method, and use it to produce a photographic record of the plants and birds along one kilometre of their locality, following the "photograph first, identify later" rule of iNaturalist-based courses and the effort-based recording of eBird. On completion the student can lay out and walk a transect, record on a field sheet, identify common species with guides and apps, upload to a citizen science platform, compute species richness, and state what the survey did not detect.

Hour allocation

Learn 6 hours (lectures 4, reading 2); Test 1; Do 6; Report 2.

STAGE 01 · LEARN

LECTURES

1. **Why survey, why a transect** (45 min). Sample versus census; transects, point counts, quadrats; what 1 km can and cannot show; permanent transects and repeat visits; how citizen data feeds State of India's Birds and PBRs.
2. **Laying out and walking the line** (45 min). A route through two or more habitats; start and end landmarks with coordinates; 1 km per hour; a station every 100 m; the 1 m string quadrat for herbs at three stations; the first two hours after sunrise for birds.
- 3.



Recording plants (45 min). Whole plant, leaf arrangement, flower or fruit, bark, with a pen or coin for scale; habit classes; local names first; common trees, shrubs and weeds of the plains; invasives such as Lantana, Parthenium and water hyacinth.

4. **Recording birds** (45 min). Seen versus heard; size, shape, bill, behaviour, habitat; twenty common village and wetland birds; Merlin Bird ID and eBird; complete checklists with effort; why "many birds" is not data.
5. **From field sheet to finding** (30 min). Richness per habitat; comparing stations; uploading to iNaturalist and eBird; research grade; no disturbance, no nest photography, no call playback.

READING MATERIAL

- Transect and quadrat method, adapted from Hitchcock et al. (2021) and UGC Unit 8.
- Illustrated key to 30 common trees and shrubs of the middle Ganga plain with Hindi and Maithili names.
- Key to 25 common birds, with a note on winter ducks.
- The field sheet (station, time, habitat, plants, birds, photo numbers, notes).
- How State of India's Birds 2023 uses eBird data and where the biases lie.

STAGE 02 · TEST

Blueprint: 20 questions, 25 minutes; lectures 1 to 4: 4 or 5 each; lecture 5: 2.

Q1 A line transect is:

- a. a random district sample
- b. a fixed route along which observations are recorded
- c. a count of every organism
- d. a lab test



Q2 Best time for a bird transect:

- a. noon
- b. the first two hours after sunrise**
- c. after dark
- d. any time

Q3 The 1 m string quadrat records:

- a. birds
- b. trees
- c. herbs and grasses**
- d. fish

Q4 An invasive plant common on Bihar roadsides:

- a. Parthenium**
- b. Peepal
- c. Arjun
- d. Makhana



Q5 A plant photograph for identification should include:

- a. only the flower
- b. whole plant, leaf arrangement and flower or fruit with a scale object**
- c. the hand only
- d. the sky

Q6 An eBird "complete checklist" lists:

- a. every Indian species
- b. all species detected during the recorded effort**
- c. only rare species
- d. only photographed species

Q7 An iNaturalist observation becomes research grade when:

- a. uploaded
- b. the community agrees on an identification**
- c. it is a bird
- d. the photo is sharp



Q8 Species richness is:

- a. the number of species recorded
- b. the number of individuals
- c. biomass
- d. the number of habitats

Q9 Prohibited on the transect:

- a. photographing a tree
- b. noting a call
- c. playing recorded calls to attract birds
- d. noting the time

Q10 State of India's Birds 2023 is built mainly on:

- a. a Forest Department census
- b. eBird observations by birdwatchers
- c. satellite images
- d. hunting records

STAGE 03 · FIELD WORK

Do

Task. Walk a fixed 1 km transect through at least two habitats, twice (one morning for birds and plants, a second visit to repeat plants and fill gaps). Record every 100 m station, photograph every distinct plant and every bird that can be photographed, run three 1 m quadrats, and produce a species list. Optionally upload to iNaturalist and eBird.



Location. Village edge, riverbank, canal bund, pond margin, roadside grove or campus, or a combination; start and end points proposed on the portal map and approved by the coordinator. Notified forest excluded.

Steps. Inform the mukhiya or principal; photograph the start landmark with the student in frame and location on; walk slowly, stopping five minutes at each 100 m station to note habitat, photograph new plants and count birds; at stations 3, 6 and 9 lay the quadrat and photograph it from above; photograph the end landmark; repeat on a second day; identify at home with the keys, Merlin or iNaturalist suggestions, marking uncertain identifications as uncertain; compile richness per habitat.

Evidence (geotagged, minimum 20). Student at start and end landmarks; at least ten plant photographs each with a whole-plant and a close-up view and a scale object, at least three with the station number written on paper in frame; at least four bird photographs, or the habitat with the field sheet entry where a bird was only heard; the three quadrats from above with string visible and the student's shoes at the edge; the completed field sheet; a screenshot of any upload.

Safety and consent. Pairs; stay on paths and bunds; avoid tall grass near water; no nest or roost disturbance; ask before crossing private land. No photographs of people needed.

STAGE 04 · REPORT

Sections (900 to 1,200 words plus tables): transect description with map, habitats, timings; plant table (local name, scientific name where known, habit, station, photo number); bird table (count, station, seen or heard, photo number); findings (richness per habitat, invasives, surprises); limits and what another season would add; photo index.

Rubric (out of 20): transect design and documentation 4; completeness and accuracy of tables 6; identification quality and honest uncertainty 4; habitat analysis and limitations 4; presentation 2.

Glossary



Line transect; station; point count; quadrat; habitat; species richness; invasive species; habit; complete checklist; research grade; detection; field sheet.

References

- Hitchcock, Sullivan and O'Donnell (2021), Citizen Science: Theory and Practice.
<https://theoryandpractice.citizenscienceassociation.org/articles/10.5334/cstp.439>
- State of India's Birds 2023. <https://stateofindiasbirds.in/>
- Bird Count India, SoIB 2023 summary. <https://birdcount.in/state-of-indias-birds-2023/>
- BNHS Conservation Education Centre. <https://www.bnhs.org/content-details/mumbai-cec>
- UGC Core Module Syllabus, Unit 8. https://www.ugc.gov.in/pdfnews/2269552_environmentalstudies.pdf

MODULE 3

Ethnobotany and the People's Biodiversity Register

FIELD

15 HOURS

Overview and learning outcomes

The Society's core subject. Students learn what ethnobotany is, how plant knowledge is held in Bihar villages, what the Biological Diversity Act requires a BMC to record in a PBR, and how to interview elders with prior informed consent. On completion the student can conduct an ethnobotanical interview, record 15 to 20 medicinal plants with local name, part used, preparation, ailment, source and availability, photograph each, and present the result in a simplified PBR format the panchayat's BMC could use.

Hour allocation

Learn 6 hours (lectures 4, reading 2); Test 1; Do 6; Report 2.

STAGE 01 · LEARN

LECTURES

1. **Ethnobotany: people, plants, knowledge** (45 min). Definition and scope; codified Ayurveda versus undocumented household and folk practice; why knowledge is disappearing; the National Medicinal Plants Board under the Ministry of Ayush and state boards; what the Society documents at Bakhtiyarpur.
2. **The People's Biodiversity Register** (45 min). Section 41 of the Act and the BMC; NBA's revised 2013 guidelines and the prescribed formats covering landscape, water, people, wild and cultivated plants, animals and associated knowledge; the Technical Support Group; the Bihar State Biodiversity Board; the PBR as a legal document.



3. **Prior informed consent and benefit sharing** (45 min). Why traditional knowledge is protected; access and benefit sharing under the Act and the 2023 amendment; the consent script; attribution and anonymity; recording a claimed use versus endorsing it.
4. **Medicinal plants of the Bihar plains** (60 min). About thirty species: tulsi, neem, giloy, aloe, amla, bel, harsingar, ashwagandha, bhringraj, brahmi, kalmegh, satavar, punarnava, bhumi amla, arjun, sadabahar, makoy, chirchita and others; parts used and household preparations as reported in the literature; toxic plants such as dhatura and akwan, recorded but never tried.
5. **The interview and the plant walk** (45 min). Choosing informants (elders, healers, women managing household remedies, cattle keepers); open before closed questions; walking to the plant; photographing plant and, with consent, informant; recording in the informant's words; cross-checking with a second informant.

READING MATERIAL

- Introduction to ethnobotany with Indian examples (National Medicinal Plants Board publications; the Society's field notes).
- The PBR format explained (NBA guidelines; Bihar State Biodiversity Board) and the simplified five-column sheet used here.
- The consent script in Hindi and English; one page on access and benefit sharing.
- Illustrated list of thirty medicinal plants of Bihar.
- Interview checklist and a filled sample sheet.

STAGE 02 · TEST

Blueprint: 20 questions, 25 minutes; lecture 1: 3; lecture 2: 5; lecture 3: 4; lecture 4: 5; lecture 5: 3.



Q1 Ethnobotany studies:

- a. plant chemistry only
- b. the relationship between people and plants, including knowledge and use**
- c. forest law
- d. crop yields

Q2 Under section 41 of the Biological Diversity Act a BMC is constituted by:

- a. every local body such as a panchayat or municipality**
- b. the Supreme Court
- c. universities
- d. the Forest Survey of India

Q3 NBA's revised PBR guidelines date from:

- a. 2002
- b. 2008
- c. 2013**
- d. 2023



Q4 A Technical Support Group helps a BMC by:

- a. funding it
- b. listing local names and traditional knowledge of flora and fauna**
- c. replacing it
- d. selling its data

Q5 Prior informed consent means the informant:

- a. is paid
- b. is told the purpose and agrees before the interview**
- c. signs after publication
- d. is photographed

Q6 Toxic, to be recorded but never tried:

- a. Tulsi
- b. Dhatura**
- c. Amla
- d. Giloy



Q7 The National Medicinal Plants Board works under:

- a. Ministry of Ayush
- b. Ministry of Home Affairs
- c. ICAR
- d. NITI Aayog

Q8 The part of arjun usually used traditionally:

- a. root
- b. bark
- c. flower
- d. seed

Q9 When an elder reports a use the student should:

- a. test it
- b. record it as reported in the informant's words
- c. omit it if not in a textbook
- d. replace it with the Ayurvedic name



Q10 The State Biodiversity Board's role in PBRs is to:

- a. prepare them alone
- b. guide and technically support BMCs**
- c. audit the panchayat
- d. sell them

STAGE 03 · FIELD WORK

Do

Task. In one village or ward, interview at least three informants (one a woman, two aged sixty or above where possible) about plants used for human or livestock health, walk with them to the plants, and record 15 to 20 species in the simplified PBR sheet with photographs.

Location. The student's own or a nearby village, or a peri-urban ward with settled elders; proposed on the portal and approved. The mukhiya or ward member is informed and asked whether a BMC exists.

Steps. Visit the panchayat office and ask about the BMC and any PBR; find informants through the mukhiya, ASHA or anganwadi worker, or family networks; read the consent script and record consent (name, date, whether to be named); ask which plants are used for fever, cough, wounds, stomach, skin, joints, cattle, where each grows, which part, how prepared, whether easier or harder to find than twenty years ago; walk to each plant and photograph it and, with consent, the informant with it; repeat with the other informants and note agreements and disagreements; compile the sheet (local name, scientific name if confident, part, preparation and ailment as reported, source, availability trend, informant code, photo number).

Evidence (geotagged, minimum 20). Student at the panchayat building or village name board; at least fifteen plant photographs in the village, each with a paper showing the local name in frame; at least three photographs of the student with an informant beside a plant (consent recorded; informant may face away); the consent sheet; the filled PBR sheet; the notebook open at an interview page.

Safety and consent. Consent before every interview; no voice recording without consent; informants may stop at any time; no payment, but a printed copy of the finished sheet is offered to informants and the mukhiya; nothing ingested or applied; toxic plants photographed from a distance.

STAGE 04 · REPORT

Sections (1,000 to 1,200 words plus sheet): village and informant profile, BMC status; the PBR sheet; patterns (ailments with most remedies, plants named by all informants, wild versus homestead, availability trends); transmission (who holds knowledge, who is learning, what is being lost); ethics and what informants asked in return; recommendation to the BMC or panchayat; photo index.

Rubric (out of 20): consent and ethics 4; completeness and care of the sheet 6; interview quality and cross-checking 4; analysis of patterns and transmission 4; recommendation and presentation 2.

Glossary

Ethnobotany; traditional knowledge; prior informed consent; access and benefit sharing; Biodiversity Management Committee; Technical Support Group; informant; homestead garden; availability trend; pharmacognosy; folk remedy; toxic plant.

References

- National Biodiversity Authority. <https://www.nbaindia.nic.in/>
- The Biological Diversity Act 2002, section 41.
https://www.indiacode.nic.in/bitstream/123456789/21545/1/the_biological_diversity_act,_2002.pdf
- The Biological Diversity (Amendment) Act 2023. <https://egazette.gov.in/WriteReadData/2023/247815.pdf>
- Bihar State Biodiversity Board. <https://bsbb.bihar.gov.in/>
- Haryana State Biodiversity Board, PBR page (clear public description of formats and the TSG).
<https://sbb.haryanaforest.gov.in/project/peoples-biodiversity-register-pbr/>
- National Medicinal Plants Board. <https://nmpb.nic.in/> and Bihar page <https://nmpb.nic.in/states/bihar>



MODULE 4

Rivers, Ponds and Wetlands: Water Quality in the Field

FIELD

15 HOURS

Overview and learning outcomes

Students learn how a river reach, a village pond and a wetland work, what pollutes them in Bihar, how CPCB classifies water by designated best use, and what can be observed and measured without a laboratory. On completion the student can choose an observation point, complete a structured checklist of physical, biological and use observations, take simple measurements (transparency, temperature, optional pH), map pollution sources and encroachment, and relate the result to the CPCB class the water should meet.

Hour allocation

Learn 6 hours (lectures 4, reading 2); Test 1; Do 6; Report 2.

STAGE 01 · LEARN

LECTURES

1. **Rivers and wetlands of Bihar** (45 min). The Ganga through the state; Nepal-origin north bank rivers and south bank rivers such as Sone, Punpun and Falgu; chaur and mauns; ahars and pynes; the Ramsar sites; wetland functions (flood buffer, recharge, fish, makhana, birds).
2. **What pollutes water in Bihar** (45 min). Untreated sewage; the open defecation legacy and Swachh Bharat; agricultural runoff; dumping on banks; ghat activity and immersion; industrial effluent where present; arsenic and fluoride in groundwater as a separate issue; pond encroachment and filling.
- 3.

CPCB designated best use (45 min). Classes A to E: drinking source without conventional treatment, outdoor bathing, drinking source after treatment, wildlife and fisheries, irrigation and industrial cooling; Class B criteria of dissolved oxygen 5 mg/L or more, BOD 3 mg/L or less, pH 6.5 to 8.5; what DO and BOD mean; Ganga monitoring and NMCG.

4. **Observation without a laboratory** (60 min). White plate transparency on a marked string; household thermometer; colour and odour; film, foam, floating solids; algal bloom and hyacinth cover; drains and outfalls; bank erosion; biological indicators (dragonflies, snails, fish, frogs, waterbirds, or their absence); uses (bathing, washing, cattle, fishing, drinking); optional pH strip.
5. **Wetland law and the citizen** (45 min). Wetlands Rules 2017, prohibited activities and the state wetland authority; the Water Act 1974 and the Bihar State Pollution Control Board; Jal-Jeevan-Hariyali pond restoration; Ganga Prahari volunteers; how to report an encroachment or drain.

READING MATERIAL

- Rivers and wetlands of Bihar (FMISC; Bihar State Wetland Authority).
- CPCB Water Quality Criteria for Designated Best Use, one page.
- The field checklist (site, time, weather, physical observations, measurements, indicators, uses, sources, sketch).
- NMCG and its Bihar projects, short note.
- Wetlands Rules 2017 summary and how a citizen complaint is filed.

STAGE 02 · TEST

Blueprint: 20 questions, 25 minutes; lectures 1 to 4: 4 or 5 each; lecture 5: 2.



Q1 An ahar-pyne system is:

- a. a sewage system
- b. a traditional irrigation system of embanked catchments and channels**
- c. a fish market
- d. a dam

Q2 CPCB Class B water is fit for:

- a. drinking untreated
- b. outdoor bathing**
- c. irrigation only
- d. cooling only

Q3 Minimum dissolved oxygen for Class B:

- a. 1 mg/L
- b. 3 mg/L
- c. 5 mg/L**
- d. 10 mg/L



Q4 High BOD indicates:

- a. clean water
- b. a large organic load being decomposed**
- c. high oxygen
- d. low temperature

Q5 A white plate lowered until it disappears measures:

- a. depth
- b. transparency**
- c. salinity
- d. flow

Q6 Dense water hyacinth most likely indicates:

- a. nutrient enrichment**
- b. high oxygen
- c. cold water
- d. no sewage



Q7 The Wetlands (Conservation and Management) Rules were notified in:

- a. 2002
- b. 2010
- c. 2017**
- d. 2023

Q8 The Act that created the Pollution Control Boards:

- a. Water Act 1974**
- b. Forest Act 1927
- c. DM Act 2005
- d. BD Act 2002

Q9 Ganga Prahari volunteers are trained by:

- a. the Wildlife Institute of India under NMCG**
- b. the Election Commission
- c. NABARD
- d. UGC



Q10 The safe way to observe a river here:

- a. wading
- b. by boat
- c. from the bank without entering**
- d. swimming

STAGE 03 · FIELD WORK

Do

Task. Select one water body (river reach, canal, or village or town pond) and one bank observation point. Complete the checklist at two times (morning and late afternoon, or two days), take transparency and temperature readings, map pollution sources within 200 m, tally uses for thirty minutes, and photograph everything.

Location. Any safe ghat, pond edge, canal bridge or wetland margin; proposed and approved; excluded during flood alerts.

Steps. Inform the mukhiya or ward member and check advisories; photograph the water body with the student in frame; record time, weather, recent rain; note colour against white paper, odour, film, floating solids, turbidity, flow; lower the white plate from a ghat step until it disappears and note the mark; take edge water in a clean jar (stick-mounted cup if needed) and read the thermometer; dip a pH strip if available; list visible plants and animals for fifteen minutes; walk 200 m each way photographing every drain, dump, wallow, washing point and encroachment; tally uses for thirty minutes; repeat at the second time.

Evidence (geotagged, minimum 15). Student at the observation point; the plate test with the marked string visible; the thermometer reading in the jar; the jar against white paper; at least four pollution sources or encroachments with landmarks; at least two use photographs at a distance; at least two biological indicators; both filled checklists.

Safety and consent. Never enter water; two metres from unstable banks; no visit in rain, warning or darkness; ghat users photographed only at a distance as part of the scene.

STAGE 04 · REPORT

Sections (900 to 1,200 words plus checklist and sketch map): the water body, its uses and the CPCB class it should meet; comparison table of both visits; pollution sources and encroachments with sketch map; assessment of whether it appears to meet its use, on what evidence, and what a laboratory would add; responsible body, Rules and programme; recommendation; photo index.

Rubric (out of 20): checklist and measurements 6; source mapping 4; reasoning from observation to class and honesty about limits 5; institutional analysis and recommendation 3; presentation 2.

Glossary

Reach; ghat; ahar and pyne; chaur; designated best use; dissolved oxygen; biochemical oxygen demand; transparency; eutrophication; outfall; encroachment; riparian.

References

- CPCB, Water Quality Criteria for Designated Best Use.
https://cpcb.gov.in/wqm/Designated_Best_Use_Water_Quality_Criteria.pdf
- Wetlands (Conservation and Management) Rules 2017.
<https://moef.gov.in/uploads/2020/01/final-version-and-printed-wetland-guidelines-rules-2017-03.01.20.pdf>
- Bihar State Wetland Authority. <https://bswa.bihar.gov.in/>
- NMCG, Namami Gange. <https://nmcg.nic.in/NamamiGanga.aspx>
- NMCG and WII, Ganga Prahari. <https://nmcg.nic.in/wii/prgbggp.aspx>
- Jal-Jeevan-Hariyali Mission. <https://jaljeevanhariyali.bihar.gov.in/>



MODULE 5

Living with Floods: Community Disaster Preparedness

FIELD

15 HOURS

Overview and learning outcomes

Students learn the risk framework used by NDMA and BSDMA, the structure of a village disaster management plan, and the participatory tools of community based disaster risk reduction: hazard and resource mapping, seasonal calendars and household checklists. On completion the student can run a ten-household flood preparedness survey, draw a hazard and resource map of one settlement, identify safe shelters, routes and vulnerable households, and compare what exists with NDMA's 2024 guidelines.

Hour allocation

Learn 6 hours (lectures 4, reading 2); Test 1; Do 6; Report 2.

STAGE 01 · LEARN

LECTURES

1. **Bihar's flood problem** (45 min). The 73 percent figure and its source; Nepal-origin rivers and embankments; the Kosi breach of 2008 and 3.3 million affected; flash floods, drainage congestion and waterlogging as distinct problems; drought and heat; the chain from NDMA to BSDMA to district and panchayat.
2. **Hazard, vulnerability, capacity, risk** (45 min). Definitions with village examples; who is most vulnerable (landless, elderly, disabled, pregnant women, children, livestock keepers, kutchha houses, houses below the embankment); capacities (boats, high ground, pucca schools, mobile networks, self-help groups, Aapda Mitra volunteers).



3. **The village disaster management plan** (60 min). As described in NIDM's module and NDMA's CBDRR 2024 guidelines: the village committee; task forces for early warning, evacuation, search and rescue, first aid, shelter, water and sanitation, relief; hazard, resource and safe route maps; seasonal calendar; mock drills; where the plan is kept and who updates it.
4. **Household preparedness** (45 min). BSDMA's before, during and after advice: emergency kit, documents in waterproof bags, raised storage of grain and fodder, knowing shelter and route, warning sources (Central Water Commission bulletins, district control room, panchayat), livestock plans, safe water and ORS, what not to do.
5. **The survey and the map** (45 min). The twenty-question questionnaire; sampling across the settlement; walking with a resident to draw the map (high ground, school, hand pumps, boats, roads that flood, embankment, PHC); the seasonal calendar with residents.

READING MATERIAL

- Bihar flood facts (FMISC; Bihar State Disaster Management Plan); Kosi 2008 needs assessment summary.
- NDMA CBDRR 2024 roadmap and NIDM village plan module, summaries.
- BSDMA flood do's and don'ts, with attribution.
- The household questionnaire and map legend.
- Aapda Mitra fact sheet.

STAGE 02 · TEST

Blueprint: 20 questions, 25 minutes; lectures 1 to 4: 4 or 5 each; lecture 5: 3.



Q1 The 2008 Kosi flood began with a breach at:

- a. Kusaha
- b. Patna
- c. Bhagalpur
- d. Buxar

Q2 Risk is a function of:

- a. hazard alone
- b. hazard, exposure and vulnerability, reduced by capacity
- c. rainfall
- d. population

Q3 A capacity, not a vulnerability:

- a. kutcha house
- b. landlessness
- c. a pucca school on high ground
- d. old age



Q4 NDMA's CBDRR guidelines were issued in:

- a. 2005
- b. 2016
- c. October 2024**
- d. 2030

Q5 Village plans typically include task forces for:

- a. elections
- b. early warning, search and rescue, first aid and shelter management**
- c. tax collection
- d. road building

Q6 A resource map marks:

- a. only hazards
- b. assets such as boats, high ground, hand pumps and safe buildings**
- c. only houses
- d. the district boundary



Q7 Aapda Mitra trains:

- a. forest guards
- b. community volunteers in disaster response**
- c. engineers
- d. teachers only

Q8 Before the monsoon a household should keep in a waterproof bag:

- a. newspapers
- b. identity and land documents**
- c. textbooks
- d. receipts

Q9 During a flood drinking water should be:

- a. taken from floodwater
- b. boiled or treated**
- c. taken from a submerged hand pump
- d. avoided

Q10 Bihar's apex disaster management body:

- a. BSDMA
- b. NDRF
- c. FMISC
- d. NIDM

STAGE 03 · FIELD WORK**Do**

Task. In one flood-affected or flood-exposed settlement, survey ten households spread across it, walk with a resident to draw a hazard and resource map, record a seasonal calendar, and note whether a committee, plan, drill or volunteers exist.

Location. A settlement in a flood-affected block; for students in unflooded areas, one exposed to waterlogging or a drainage channel. Proposed with panchayat name and approved.

Steps. Meet the mukhiya or ward member and ask about committee, plan, last drill, Aapda Mitra volunteers and where the plan is kept; choose ten households across the settlement (two near the lowest point or embankment, two on high ground, two landless or daily wage, two with elderly or disabled members, two others); for each, consent and the twenty questions on flood history, warning sources, kit, documents, shelter, route, livestock, water, losses and needs; walk with a resident to sketch the settlement with north, house types, high ground, school, PHC or sub-centre, hand pumps, boats, flooding roads, embankment, direction of floodwater, last shelter used; ask three residents to describe the year month by month (flood, crop, disease, migration) as a seasonal calendar; photograph the map with the helper.

Evidence (geotagged, minimum 12). Student at the panchayat office or settlement board; at the lowest point or embankment with the settlement behind; at the identified safe shelter; at least three interviews in progress outside the house, faces optional with consent; the map held up by student and helper; the calendar sheet; at

least two preparedness features (raised platform, boat, past flood mark on a wall, raised hand pump); the ten filled questionnaires.

Safety and consent. No survey during a flood or warning; no photographs inside homes; consent for every household; skip recently bereaved households; promise no relief or benefit; carry the introduction letter.

STAGE 04 · REPORT

Sections (1,000 to 1,200 words plus map, calendar and table): settlement profile and flood history; institutional status; household table (ten rows) and who is prepared; the map with legend and the calendar; gaps against NDMA CBDRR; three recommendations to the panchayat; photo index.

Rubric (out of 20): sampling and data quality 6; map and calendar 5; gap analysis 4; recommendations 3; presentation and ethics 2.

Glossary

Hazard; exposure; vulnerability; capacity; risk; early warning; evacuation route; safe shelter; village disaster management committee; task force; seasonal calendar; mock drill.

References

- NDMA, CBDRR Guidelines, October 2024.
https://ndma.gov.in/sites/default/files/PDF/Guidelines/CBDRR_Guidelines_Oct_2024.pdf
- NIDM, Village Disaster Management Plan: Training Module. <https://nidm.gov.in/PDF/modules/village.pdf>
- BSDMA, Flood. <https://bsdma.bihar.gov.in/en/flood>
- FMISC, History of floods. <https://fmiscwrbihar.gov.in/fmis/history.html>
- GFDRR, Bihar Kosi Flood (2008) Needs Assessment Report.
<https://www.gfdr.org/sites/default/files/publication/pda-2010-india.pdf>
- NDMA, Aapda Mitra. https://ndma.gov.in/Capacity_Building/Admin_Coordination/Aapda-Mitra
-



Disaster Management (Amendment) Act 2025 (PIB).

<https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=2226438>



MODULE 6

Waste, Plastics and Green Action

FIELD

15 HOURS

Overview and learning outcomes

Two linked tasks: a waste audit that shows what a market or campus actually throws away, and a plantation with a school that leaves something growing behind. Students learn the Solid Waste Management Rules 2016, the Plastic Waste Management Rules and the single use plastic ban, the count-and-classify audit method, and how to choose and plant native species that survive Bihar's floods and summers. On completion the student can characterise a waste stream, identify banned items, propose a segregation plan, plant at least ten saplings correctly with children, and set up survival monitoring.

Hour allocation

Learn 5 hours (lectures 3.5, reading 1.5); Test 1; Do 7 (audit 3.5, plantation 3.5); Report 2.

STAGE 01 · LEARN

LECTURES

- 1. Where Bihar's waste goes** (45 min). Generation in towns and villages; the collection gap; dumping on banks and ponds; burning; waste pickers and kabadiwalas; Swachh Bharat Mission (Urban and Gramin) and Swachh Survekshan; a nagar panchayat's duties.
- 2. The Rules** (45 min). SWM Rules 2016: three-stream segregation at source and the duties of generators and bulk generators; Plastic Waste Management Rules 2016 and amendments; the 1 July 2022 ban list (plates, cups, cutlery, straws, thermocol decoration, thin banners and others); extended producer responsibility in one paragraph.



3. **The waste audit method** (45 min). Site and time; five fixed points; fifteen-minute count-and-classify windows; categories (wet, paper, plastic film, rigid plastic, banned items, glass, metal, textile, sanitary, e-waste, other); optional shop-scale weighing; interviewing two vendors and a sweeper.
4. **Plantation that survives** (45 min). Native species for Bihar (neem, peepal, bargad, jamun, bel, amla, arjun, mahua, kadamb, sheesham, karanj, bamboo, fruit species for schools); species for waterlogged versus dry ground; 45 cm pits, collar depth, watering, guards from bamboo or thorn; the monsoon planting window; why plantations fail; Ek Ped Maa Ke Naam and the eco-club link.
5. **Handing it over** (30 min). A one-page plan a school eco-club can follow; watering rota; monthly survival count; a segregation plan a market committee can adopt.

READING MATERIAL

- SWM Rules 2016, rule 4 duties of waste generators, one page.
- PIB note on the single use plastic ban and item list.
- The tally sheet and vendor interview questions.
- Native species planting guide for Bihar with pit diagram, drawn from Forest Department nursery practice and the Society's plantation experience.
- The eco-club handover template.

STAGE 02 · TEST

Blueprint: 20 questions, 25 minutes; lecture 1: 3; lecture 2: 6; lecture 3: 4; lecture 4: 5; lecture 5: 2.



Q1 SWM Rules 2016 require generators to segregate into:

- a. two streams
- b. biodegradable, non-biodegradable and domestic hazardous** ●
- c. five colours
- d. no streams

Q2 Banned from 1 July 2022:

- a. glass bottle
- b. plastic straw** ●
- c. cotton bag
- d. steel plate

Q3 Extended producer responsibility means:

- a. consumers pay a tax
- b. producers, importers and brand owners must collect and manage their plastic packaging waste** ●
- c. panchayats make plastic
- d. waste pickers are licensed



Q4 Count-and-classify records:

- a. price
- b. the number of items per category at a point over a fixed time**
- c. only weight
- d. only plastic

Q5 Sanitary and medical waste in an audit is:

- a. handled and weighed
- b. counted but not handled**
- c. ignored
- d. burned

Q6 A suitable planting pit here is about:

- a. 10 cm cube
- b. 45 cm cube**
- c. 2 m cube
- d. no pit



Q7 Native and suited to the Bihar plains:

- a. Eucalyptus
- b. Jamun**
- c. Pine
- d. Lantana

Q8 Best planting window in Bihar:

- a. April to May
- b. the onset of the monsoon, June to August**
- c. December
- d. any time

Q9 Ek Ped Maa Ke Naam was launched on:

- a. 26 January 2020
- b. 2 October 2021
- c. 5 June 2024**
- d. 15 August 2025

Q10 The main reason first-year plantations fail:

- a. too many species
- b. lack of watering and protection after planting**
- c. too much rain
- d. soil colour

STAGE 03 · FIELD WORK**Do**

Task A, waste audit (3.5 hours). At a weekly market, sabzi mandi, bus stand or campus, select five points; at each, in a fifteen-minute window, count and classify every waste item on the ground or in the nearest bin; photograph a sorted sample; interview two vendors and one sweeper about where the waste goes; note banned items.

Task B, plantation (3.5 hours). With a government school head (or an anganwadi with space), plant at least ten saplings of at least three native species with students, using correct pits, 3 m spacing and guards. Saplings can be obtained from the Forest Department nursery, the Jal-Jeevan-Hariyali programme, or raised from seed; the portal supplies a request letter for the range office. Leave a watering rota and survival count sheet with the eco-club or a teacher and agree a return visit after four weeks.

Location. Task A: market, bus stand or campus; Task B: a school near home. Both proposed and approved; the market committee or sanitary inspector and the school head informed.

Steps. Audit: arrive at the busiest hour; photograph the site with the student in frame; run the five tallies; sort a sample onto a sheet for a categorised photograph; interview; photograph bins, dumps and burning; note banned items in use. Plantation: agree site, species and date with the head; collect saplings; mark spacing, dig pits, mix soil, plant at collar depth, firm, water, guard; photograph each stage; hand over the rota and count sheet.

Evidence (geotagged, minimum 20). Audit: student at the entrance name board; one photograph per point showing waste and tally sheet; a sorted sample laid out by category with labels; bins, dump or burning site; at least

two banned items. Plantation: student with the head or teacher at the school board; pits dug with a tape or hand for scale; wide shots of students planting; each sapling with guard, student in frame for at least three; the rota and count sheet handed over; the survival count if a return visit falls within the semester.

Safety and consent. Gloves or stick for sorting; no sanitary or medical waste handled; hand washing; school head's permission for photographs of children; children do not dig deep pits or use tools beyond their age; no planting under power lines or on an embankment without permission.

STAGE 04 · REPORT

Sections (1,000 to 1,200 words plus tally table): audit site and method; results by point and category, plastic share, banned items; where the waste goes now; a segregation plan against SWM Rules 2016; plantation record (school, species, numbers, site, who waters); survival plan and any first count; photo index.

Rubric (out of 20): audit data and categorisation 6; segregation plan grounded in the Rules 4; plantation execution and species choice 5; handover and monitoring 3; presentation 2.

Glossary

Waste generator; bulk waste generator; segregation at source; biodegradable; domestic hazardous waste; single use plastic; extended producer responsibility; waste audit; native species; sapling collar; tree guard; survival rate.

References

- Solid Waste Management Rules 2016 (as amended).
https://investmeghalaya.gov.in/resources/homePage/17/megeodb/rules/Solid_Waste_Management_Rules.pdf
- PIB, Ban on identified single use plastic items from 1 July 2022.
<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1837518>
- PIB, Parliament question on Ek Ped Maa Ke Naam.
<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2086126>
- MoEFCC Environment Education Programme. <https://eepmoefcc.nic.in/>



- WWF-India, Ek Prithvi. https://www.wwfindia.org/about_wwf/environmental_education/ek_prithvi/
- Jal-Jeevan-Hariyali Mission. <https://jaljeevanhariyali.bihar.gov.in/>

ENVIRONMENTAL SCIENCE

Appendix

A. Final report template

Title page: student, university, college, roll number, district and block, field dates, coordinator.

1. Locality profile (200 words): settlement, landscape position, population, livelihoods, nearest water body, nearest grove or forest, flood history.
2. Biodiversity findings (250 words): transect summary, richness by habitat, notable and invasive species, link to any BMC or PBR.
3. Ethnobotanical findings (250 words): plants recorded, informants, most-used species, transmission and loss.
4. Water findings (250 words): water body, designated use, observations, sources, assessment.
5. Flood preparedness findings (250 words): institutional status, household readiness, map summary, gaps.
6. Waste and plantation findings (200 words): audit results, banned items, segregation plan, plantation record.
7. Cross-cutting analysis (300 words): waste and water, wetlands and floods, plants and livelihoods, knowledge and its holders.
8. Recommendations (200 words): three to five, each addressed to a named institution.
9. Reflection (150 words): what was hardest, what would change, what continues.
10. Annexures: the five module reports, photo index, consent records.



B. Field evidence checklist

- Location services on; coordinates match the approved site within the portal's tolerance.
- Student visible in the entry and exit photographs and in the task-specific shots listed in each module.
- Every required photograph category present in the stated minimum number.
- Photographs of people accompanied by a consent line; photographs of children taken with the school head's permission.
- The field sheet, checklist, PBR sheet, questionnaires or tally sheet visible in at least one photograph.
- Timestamps match the dates in the report.
- No photograph shows the student in or on the water, on an embankment during a warning, or handling hazardous waste unprotected.



C. Rubric for the final report

CRITERION	MARKS	FULL MARKS REQUIRE
Accuracy and completeness of the six findings sections	3	Each section reports the module's data correctly, with numbers, citing the annexure
Cross-cutting analysis	3	At least three findings connected with evidence; observation distinguished from inference
Recommendations	2	Specific, feasible, addressed to a named institution, grounded in an Act, Rule or programme
Reflection, ethics and presentation	2	Honest reflection; consent records complete; clear tables, map and photo index; no unverified claims

Total 10 marks.