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Model curriculum for Applied biodiversity conservation

MODULE 0. INTRODUCTION

Learning outcomes

At the end of the module participants will

- Understand the context for the course, its objectives and structure.

UNITS AND KEY ELEMENTS	LEARNING APPROACH	
0.1. COURSE INTRODUCTION • Introduction from the trainers and presentation of participants • Presentation of Pro Park's experience in capacity development for PAs • Expectations of participants. • Logistical arrangements.		
0.2 METHOD OF WORK • Course structure, agenda and programme • Rules for the course.		
0.3 COMPETENCES NEEDED BY A CONSERVATION SPECIALIST • Assessment of key competences required by a conservation specialist (based on the IUCN WCPA global register).		

MODULE 1. CONTEXT FOR BIODIVERSITY CONSERVATION

Learning outcomes

At the end of the module participants will

- Know the importance of understanding the legal context for conservation management.
- Know the main elements of the legal framework that underpins biodiversity conservation nationally and internationally.
- Know the various national and international categories and designations that can apply to protected areas, and how they affect biodiversity conservation.

• Understand the meaning of the term 'stakeholder' and the roles that various stakeholders can plan in biodiversity conservation management. • Understand the meaning of the term 'governance' and the relevance of governance to biodiversity conservation. • Define key terms relevant to applied biodiversity conservation. • Know the main elements of a protected area management plan and planning process.		
UNITS AND KEY ELEMENTS	**LEARNING APPROACH**	
1.1 Legislation and designations • What does the law say about the purpose and role of protected areas • What does the law say about biodiversity conservation • Why was the PA established? • What does the documentation say? • What is the reason for establishment and the main values of the Park? • What is the category of the PA (national and international)		
1.2. Stakeholders • Identifying primary stakeholders for a protected area. • Clarifying mandates, ownership, jurisdiction and rights.		
1.3. Governance • Defining governance • Understanding governance as it applies to conservation management of a protected area.		
1.4. Important terminology • Defining important terms with examples of their relevance to biodiversity conservation management. For example: Abiotic (physical) environment, Biome, Biogeographic region, Ecological community, Climate, Cultural landscape, Ecoregion, Ecosystem, Soil, Species, Topography, Lithology, Population, Micro-habitat, Metapopulation, Macro-habitat, Landform , Land use, Biotic resource use. Physical resource use, Landscape (ecological), Landscape/ Seascape, Hydrography, Habitat, Climate, Weather, Geology, Higher Plants, Lower Plants, Mammals, Fish, Amphibians, Reptiles, Birds, Macroinvertebrates, Microinvertebrates, Fungi, Monera & Protista.		
Useful references		

Dudley, N. et al (2013) Guidelines for applying protected area management categories. IUCN, Gland, Switzerland.
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Lausche, B. (2011). Guidelines for protected area legislation. IUCN, Gland, Switzerland.
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http://www.natreg.eu/uploads/Guidelines_stakeholder%20engagement_final.pdf
Stanciu, E. and Ioniță, A. Governance of Protected Areas in Eastern Europe. Overview on different governance types, case studies and lessons learned. Bundesamt für Naturschutz, Bonn.
http://propark.ro/images/uploads/file/publicatii/Skript360.pdf
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MODULE 2. SITE ASSESSMENT.

Learning outcomes

At the end of the module participants will

- Be able to define important terms in relation to the natural characteristics of an area
- Know how to identify biodiversity information needs and gaps.
- Know and understand the importance of secondary information and how to collect and collate it
- Know and understand the main principles and practices of collecting data in the field.
- Know how to identify and map the main ecological units of a site at different scales.
- Know the main elements of the physical environment of a site and how to gather information about them.
- Know the main techniques and options for surveying the presence, distribution and abundance of species.
- Know the main principles and methods for surveying resource use.
- Be able to conduct and lead a site based rapid ecological assessment.

UNITS AND KEY ELEMENTS	LEARNING APPROACH	
2.1. Biodiversity information and data collection. General principles and practice. • Differences between data and information.		

• Collecting data: main methods and approaches. • Collating secondary information; sources, opportunities and challenges. • Using 'non experts' to gather information (e.g. local people, rangers, tourists, 'citizen science' projects). • The relative relevance of different information categories to applied conservation management. • The importance of balancing information needs with practical considerations. • The dangers of 'information paralysis' and the need to make management decisions made on the basis of partial information • Organising, managing and storing data. Practical considerations.		
2.2 Information needs assessment • Main categories of information for biodiversity conservation management. • Sources of information ***CONTEXT*** ○ Establishing document of the PA ○ Boundaries of the PA ○ Legal status of the PA ○ Stakeholder analysis ○ Land tenure and rights ○ Land and resource use ○ Neighbouring land users ○ Management history and records ○ Research and educational use ○ Map coverage ***PHYSICAL ENVIRONMENT*** ○ Geology/Landforms ○ Hydrography ○ Climate ○ Soil ***BIOTIC ENVIRONMENT*** ○ Biogeographical areas ○ Flora ○ Fauna ○ Mammals ○ Birds ○ Fish ○ Reptiles and Amphibians ○ Invertebrates ○ Ecosystems and habitats ○ Landscapes		
2.3 Identifying and mapping ecological units • **The main types of ecological unit used for subdividing protected areas and landscapes at different scales (e.g. biome, landscape, ecosystem, habitat, community etc.)** • **The standard ecological units used in the country or region (e.g. Corine biotopes).** • Sources of information about ecological units.		

• Simple techniques for identifying and mapping ecological units. • **Deciding the most appropriate 'resolution' of information required for starting effective management.**		
2.4 **Surveying species** 2.3.1 Finding and identifying species • Direct observation; active searching, sounds; signs; capture; remote detection; interviews; secondary sources. • Methods for different taxa and different types of distribution. 2.3.2 Rapid and opportunistic assessment techniques. • Wide patrol; opportunistic accumulation; 'bioblitz'; ranger notebooks, citizen science 2.3.3 Sampling approaches and their uses. • Random sampling, systematic sampling, stratified random sampling. 2.3.4 Sampling methods and their uses. • Transects, quadrats, point counts 2.3.5 Distribution studies. Applications and techniques. 2.3.6 Abundance and density studies. Applications and techniques. 2.3.7 Practical considerations. Gathering minimum required information for management using practical cost effective methods. Focusing on management oriented surveys rather than biodiversity research.		
2.5 In depth studies • The use of special studies to supplement general survey information, based on the specific context of a protected area. • Examples include: autecological studies; ecological processes studies, hunting impact studies; habitat analysis; land and resource use surveys; water budget assessments, surveys of indigenous knowledge etc.		

Useful references

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Hill, D., Fasham, M., Tucker, G., Shewry, M.and Shaw, P. (2005).Handbook of Biodiversity Methods. Survey, Evaluation and Monitoring. Cambridge University Press, Cambridge.

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http://www.ecolab.bas.bg/main/Members/snikolov/Sutherland_2006_Ecological_Census_Techniques.pdf
Worboys et. Al (2015) Protected area governance and management. ANU Press, Canberra.
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MODULE 3. EVALUATION.

Learning outcomes

At the end of the session participants will

- Understand key scientific concepts for species and ecosystem conservation.
- Understand and apply the concept of species of conservation interest/concern.
- Identify ecological requirements and maintaining factors for priority species and ecosystems.
- Be able to conduct a threat assessment for a site.
- Know how to identify conservation targets and priorities in a systematic way.

UNITS AND KEY ELEMENTS	Learning approach	
3.1 Important concepts and terms in conservation biology 3.1.1 Key terms and concepts that underlie science based conservation management. E.g. ecological niche, threshold, resilience, ecological amplitude, stress, recoverability, vulnerability. 3.1.2 Species and ecosystems of conservation interest or importance		

• **Protected species: International laws and agreements; National legislation** • **Red Lists. Red list categories and criteria (International, Regional, National)** • **Other species of conservation concern: Restricted range; Fragmented populations; Fragile/vulnerable species; Restricted range species; Scarce species; Rapidly declining species; Niche species; Keystone species; Indicator species; Migratory species; Flagship species; Economically important species; Culturally important species.** • **Important ecosystems.** Natural, semi natural ecosystems; plagioclimax; vulnerable ecosystems.		
3.2 Maintaining factors • Identifying the factors that maintain species and ecosystems. Ecological requirements, management requirements etc. • The importance of identifying such factors as the first step in developing management strategies.		

3.3 Threat Assessments
• Understanding pressures, threats and impacts.
• Using standard methods for assessing pressures and threats affecting species, habitats and ecosystems.In particular
  ○ The Conservation Measures Partnership Standard Taxonomy of Threats to Biodiversity.
  ○ The Natura 2000 classification of threats and pressures		

3.4 Conservation values, targets and priorities 3.4.1 Processes for selecting priority species and ecosystems for conservation action. • Using global national prioritisation assessments (e.g. Red Lists, Key Biodiversity Areas, Important Bird Areas, Important Plant Areas etc.) • Cost benefit analyses • Coarse filter/fine filter approaches • Urgency for action (consequences of the do nothing approach). • Map based approaches using GIS. Including use of spatial optimisation software such as MARXAN. 3.4.2 Finalising a list of priority conservation targets, current status, ecological requirements and threats.		

Useful References

Groves, C.R. (2003) Drafting a conservation blueprint. A practitioner's guide to planning for biodiversity. Island Press.

Hill, D., Fasham, M., Tucker, G., Shewry, M.and Shaw, P. (2005).Handbook of Biodiversity Methods. Survey, Evaluation and Monitoring. Cambridge University Press, Cambridge.

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MODULE 4. MANAGEMENT OPTIONS AND PLANS

Learning outcomes

At the end of the module participants will

- Understand and be able to apply the main approaches taken to conservation planning.
- Understand the range of options available for achieving conservation outcomes for species and ecosystems.
- Be aware of the range of guidance and decision support materials available for conservation planning.
- Prepare a structured and evidence based conservation action plan.

UNITS AND KEY ELEMENTS	Learning approach	
4.1 Conservation planning approaches • Differences between issue based and goal based planning. • Systematic conservation planning approaches. • Conceptual frameworks and theories of change (uses and limitations). • Use of MIRADI and other planning tools.		
4.2 Conservation goals and indicators • Defining and quantifying desired conservation outcomes for focal species and ecosystems. • Identifying indicators of success and means of measuring them.		
4.3 Options for management Use of standard frameworks for management options (e.g. Conservation Measures Partnership) and others.		
4.3.1. Options for management conservation management of species • Range of options and specific measures, such as:		

Non intervention, remove or reduce, encourage or increase, physical protection, threat removal, reintroduce/ reinforce, manage population, manage use, conserve ex situ, legal measures, awareness/advocacy. • Application to different taxonomic groups and issues. Large carnivores; reptiles and amphibians; fish; plant species; invertebrates; alien invasive species; human animal conflict (problem species); sustainable harvesting of non-timber forest products; Hunting/poaching management and regulation; Ex situ conservation (conservation breeding); Species reintroduction.		
4.3.2 Options for conservation management of ecosystems • Range of options and specific measures, such as: Non-intervention, limited intervention, active management, managed use, physical protection, threat removal/mitigation, restoration, legal measures, awareness/advocacy, spatial planning/zonation. • Application to different ecosystems, such as Forest and woodland; grasslands; aquatic ecosystems; caves and rocky ecosystems; high mountain/montane ecosystems; agroecosystems; urban ecosystems; coastal.		
4.4 Conservation action plans • Elements of a conservation action plan for species and ecosystems (e.g. Feature, current status, desired condition, indicator, means of management, strategy, management actions, timing, responsibility, inputs and resources required.) • Process for developing the plan.		

Useful References

Alexander, M. (2010). *A Management Planning Guide.* CMS Consortium, Talgarth, Wales, UK.
http://www.software4conservation.com/Data/Sites/1/manuals/CMSPlanningGuide.pdf

Appleton, M. R. and Meyer, H. (eds). (2014). *Development of Common Integrated Management Measures for Key Natural Assets in the Carpathians*. WWF Danube-Carpathian Programme, Vienna.
http://www.bioregio-carpathians.eu/tl_files/bioregio/donwnloads_resources/Key%20Outputs%20and%20Publication/CIMM_study_05.07.2014.pdf

Ausden. M. (2007) *Habitat Management for Conservation. A Handbook of Techniques*. Oxford University Press, Oxford.

Given, D.R. (1994). *Principles and practice of plant conservation.* Timber Press, Portland.

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http://ec.europa.eu/environment/life/publications/lifepublications/lifefocus/documents/mammals.pdf
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http://www.openbookpublishers.com/product/347/what-works-in-conservation
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	MODULE 5. MONITORING	
	Learning outcomes At the end of the session participants will • Understand the purpose of conservation monitoring in a protected area. • Know and understand the elements of a protected area monitoring programme • Design a monitoring programme and plan based on the conservation targets.	
	UNITS AND KEY ELEMENTS	**LEARNING APPROACH**

	5.1 Principles of monitoring
	Difference between survey and monitoring.
	• Difference between research- based and management-oriented monitoring.
	• Requirements of a monitoring programme.
	• Importance of linking monitoring to management and the main benefits of management oriented monitoring.
	  ○ Judging performance against a target
	  ○ Detecting when an important threshold is reached
	  ○ Finding causes and effects:
	  ○ Prove that management actions are a good use of time and funding
	  ○ Providing an early warning of unknown and unexpected problems.
	Essential components of an effective monitoring programme.		

	5.2 Main monitoring methods • Total counts: congregations, simultaneous counts, game drives, counts of known individuals, capture-mark-recapture. • Using indices of abundance. • Sampling approaches and methods. • Remote sensing and fixed point photography. • Gathering qualitative information (condition surveys etc.)		

	5.3 Indicators
	• Identifying and using suitable indicators that are
	  • *Realistic.* Indicators must be easy and cost effective to identify, measure and analyse using the available resources and skills. It is likely that long term monitoring will not be conducted by specialist researchers, but by protected area staff and local community members.
	  • *Specific, accurate and precise*. There should be a clear and ideally quantifiable link between the indicator and the condition being monitored.
	  • *Sensitive.* Indicators should be sufficiently sensitive to pick up small, but significant changes.
	  • *Unaffected by the process of monitoring*. For example, too frequent and intrusive monitoring of nesting seabirds can result in fewer chicks being reared; holding too many village workshops may change people's responses to questions.		

	5.4 Monitoring plans		

	• Developing a monitoring plan linked to protected area management plan.
	• Use of the Pressure State Response Framework (PSR)
	  ○ Applying the PSR approach to biodiversity conservation plans.
	  ○ Using PSR to link management, monitoring and investment.		

	Useful References UK common standards for monitoring guidance series. http://jncc.defra.gov.uk/page-2201 Coastal; Freshwater; Lowland grassland; Lowland heathland; Lowland wetland; Marine; Upland Habitats; Woodland; Earth Science; Amphibians; Birds; Fish; Invertebrates; Reptiles; Marine mammals; Terrestrial Mammals; Vascular plants; Bryophytes and Lichen Elzinga et. al (1998) *Measuring and monitoring plant populations.* Bureau of Land Management, Colorado http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf		

	MODULE 6. SUPPORTING SKILLS FOR CONSERVATION SPECIALISTS		
	Learning outcomes At the end of the session participants will • Know and demonstrate the essential navigation skills for working in the field. • Know and demonstrate good environmental practice for working in the field • Know and demonstrate good health and safety practice for working in the field. • Know and demonstrate good leadership and team work. • Demonstrate good communication skills in a variety of situations.		
	UNITS AND KEY ELEMENTS	**LEARNING APPROACH**	
	6.1 Health, safety and security and good environmental practice. • Use of maps, compass, GIS for navigation and orientation and location. • Safe working in the field • Assessment of hazards and risks (e.g. from accidents, wildlife encounters, human encounters)		

	• Measures to reduce risk • Training and equipment. • Emergency responses. • Minimising environmental impact of field work. • Minimising stress and impacts on fauna. • Conducting capture and/or collection of animal specimens humanely and responsibly.		
	6.2 Communication, collaboration and teamwork • Communication with co-workers. • Team work for conducting field work safely and effectively. • Communication with stakeholders (community members, people from other organisations, tourists, hunters etc.) • Dealing with interpersonal conflict. • Communicating information, findings and recommendations.		
	6.2 Using technology • Information management, storage and back up • Use of databases • Use of biodiversity information management systems • Use of GIS and related applications. • Use of electronic field based data collection devices and applications • Use of new and advanced technology (drones, tracking devices, remote sensing etc.)		
	6.4 Data analysis and presentation • Principles and practice of using descriptive statistics, tables, graphs and charts, statistical tests etc. • Best methods for communication scientific information clearly to non-expert audiences. • GIS Understand the use of descriptive statistics to analyse data and the options for presenting survey data and results.		
	Useful references Rabinowitz, A (1997). Wildlife field research and conservation training manual. Wildlife Conservation Society. New York. https://www.panthera.org/sites/default/files/WildlifeFieldResearchandConservationTrainingManualENG_ARabinowitz2.pdf		