



AMERICAN MUSEUM OF NATURAL HISTORY

CENTER FOR BIODIVERSITY AND CONSERVATION

Network of Conservation Educators & Practitioners

Guidelines for Developing
NCEP Modules

NCEP MODULE COMPONENTS:



Background documents

provide up-to-date information and references



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Teaching Media

enhance lectures with relevant visuals and presentations



Case studies

promote problem-based learning and skill development with real scenarios



Exercises

apply fundamental concepts through research and collaboration



Teaching Notes

assess student learning and needs



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A. OVERVIEW OF MODULE COMPONENTS

NCEP develops open access, multi-component, teaching and learning resources for conservation educators and practitioners. Designed for the university or professional level, each “module” covers a topic in conservation biology and is written by an expert, or team of experts, in the field. They are externally peer-reviewed and edited by NCEP for educational content, including active teaching and learning approaches. Modules are available for free through the NCEP website (<http://ncep.amnh.org>) and at NCEP workshops.

An NCEP teaching and learning module consists of a Module Guide and **one or more** components that fall into five categories: Learn, Explore, Practice, Teach, and Evaluate.

MODULE GUIDE

- A 1-2 page guide to the module, including:
 - An abstract of the module topic
 - Learning objectives and how they link to the module components
 - List of open access resources
 - **For each component**, we encourage authors to *carefully select 1-5 professionally-developed* open access resources from the world of e-learning, such as book chapters or academic articles (See Recommended Open Access Sources)
- The Module Guide is originally created by authors, but updated by NCEP staff as resources are added under the module topic

LEARN

NCEP SYNTHESIS

- A 5-10 page expert summary of the topic
- A complete bibliography of literature cited
- A glossary of key terms

A CURATED LIST OF OPEN LEARNING RESOURCES

- Annotated list of available expertly selected, **open access** resources (e.g., academic articles) for download. While these resources are ideally open access, if permission is required, a copy of our license agreement can be found at the end of this guide.

TEACH

PRESENTATION

- An easily modified collection of slides in MS PowerPoint format
- Accompanying Notes explaining each slide and including discussion questions or suggestions for active teaching of the material

EXPLORE

CASE STUDIES

- Information about specific projects, locations, species, etc. that illustrate some of the main points of a conservation topic (up to 20 pages)
- Optional accompanying visuals, such as PowerPoint slides or other media

PRACTICE

EXERCISES

- One or more hands-on activity that allows learners to apply key concepts covered in the module through practice, research, and collaboration
- Exercises should be inquiry-based and incorporate active teaching techniques

RESOURCES FOR CIVIC ENGAGEMENT

- Links to current scientifically-sound and responsible campaigns that engage the public in a conservation topic related to the module. This includes physical participation such as restoration or citizen science monitoring species or through civic engagement such as petitions, congressional letter writing, or letters to the editor of a local newspaper (See Recommended Open Access Sources)

EVALUATE

ASSESSMENT TOOLS

- Tips and tools for instructors to assess student learning and students for self-assess their own learning
 - This may include evaluation criteria, grading criteria, pre and post content questions, or rubrics

CASE STUDY SOLUTIONS

- Notes and/or a guide for implementing the Case Study in a classroom setting with solutions to discussion questions, if applicable

EXERCISE SOLUTIONS

- Notes and/or a guide for implementing the Exercise in a classroom setting with solutions to exercise questions to facilitate grading

B. GUIDELINES FOR DEVELOPING CONTENT FOR NCEP MODULES

Authors may submit modules that contain one or all of the above components. In all cases, potential authors/contributors work with NCEP staff to coordinate specifics for each module topic. Authors receive full credit and retain copyright for their contributions, and can cite their work as a peer-reviewed electronic publication. Selected module components will also be published in our online journal, *Lessons in Conservation*.

MODULE GUIDE

NCEP provides a standardized Module Guide Form for authors to submit at the initial stage of module creation.

SYNTHESIS

CONTENT

This component is intended to provide original written conceptual and factual material to be used as background or preparatory reading for teachers, and in some cases, for learners to read independently. The document synthesizes a topic in an accessible manner: key concepts are presented, controversies are framed, provocative questions are raised, and brief case studies or examples are provided. In most cases, the synthesis should be about 5-10 pages in length, though a longer synthesis may be necessary if the module covers a very broad subject.

REFERENCES

The synthesis should include a substantial set of references organized into a bibliography, including those that are cited in the text and, if appropriate, items that are not cited but are listed as complementary resources (see *NCEP Module Style Guide* for correct formatting). Please clearly note **any carefully selected, professional open access resources** (e.g., open access journal articles) that supplement or compliment the synthesis.

GLOSSARY

Specialized words or phrases that are directly relevant to the topic should be defined succinctly in the text and in an accompanying glossary. Additional words or phrases can also be included in the glossary as an aid to students, particularly if the words or phrases are not defined in common dictionaries. The glossary is intended to be a useful tool but is not intended to be onerous for authors to prepare. Glossary entries should be concise and informative, and in most cases will consist of a single phrase or sentence. For further information see the *NCEP Module Style Guide*.

Example text from "What is Biodiversity?" module:

Species diversity is the number of different species in a particular area (*species richness*) weighted by some measure of abundance such as number of individuals or biomass. However, it is common for conservation biologists to speak of species diversity even when they are actually referring to species richness. Another measure of species diversity is *species evenness*, which is the relative abundance with which each species is represented in an area.

EXAMPLE ASSOCIATED GLOSSARY DEFINITIONS:

Species diversity: the number of different species in a particular area (i.e., species richness) weighted by some measure of abundance such as number of individuals or biomass.

Species richness: the number of different species in a particular area.

Species evenness: the relative abundance with which each species is represented in an area.

CASE STUDIES

Case studies provide further information or examples on specific topics not treated in depth within the Synthesis or Presentation components of modules. Case studies address biodiversity conservation in context and focus on the personal and social meaning of conservation, emphasizing the interconnected, interdisciplinary nature of the field. They are designed to assist students in making connections between their studies and their own lives.

NCEP case studies can vary greatly on topics, but generally fall into one of three types:

- **Decision or dilemmas** that need to be addressed by a central character in a drama. An example NCEP case study of this type is "Thirsty Metropolis: A Case Study of New York City's Drinking Water."
- **Appraisal cases** centered on analyzing data and finding answers to questions. An example NCEP case study of this type is "Saving the California Condor From Extinction: A Problem Case."
- **Case histories or stories** that serve as illustrative models of successful (and unsuccessful) applications of biodiversity conservation. An example NCEP case study of this type is "The Pelagos Sanctuary for Mediterranean Marine Mammals."

NCEP case studies should consist of two main components: a) the Case Study narrative with discussion questions, which is intended for both educators and students, and b) the Case Study Teaching Notes, intended for the instructor only with answers to discussion questions and suggestions for active teaching.

CASE STUDY NARRATIVE

This document consists of up to 20 pages (single-spaced text) and includes:

- The case study main text or description (please consult the *NCEP Module Style Guide* for formatting details).
- Images and figures
- References (see Synthesis section above for more explanation)
- A Glossary of relevant terms (see Synthesis section above for more explanation)
- 5-10 Discussion Questions to provoke discussion of the issues raised in the case study. The questions relate back to the main concepts and learning goals of the case study and should be phrased in an engaging fashion so that they challenge students to think critically about the case study's topic.

CASE STUDY TEACHING NOTES

Case study authors should create teaching notes to guide the instructor on how to best implement the case study in a classroom setting as well as provide answers to any discussion questions and applicable active teaching techniques. Authors should include advice on how students can prepare for the case study as well as planning advice, such as timing, structure, facilitation, and adaptation of the case study to different classes or environments. The files

should be of minor additional effort for module authors to produce but will be of immense value to educators.

EXERCISES

Participatory exercises encourage students to find solutions to important and meaningful questions through investigations and collaborations with others. When designing exercises, authors should ensure that students acquire an understanding of key principles and concepts, develop critical thinking skills, and learn to communicate their knowledge to others. Exercises may be developed for use in the classroom, the field, or in a laboratory. Whenever possible, exercises should be designed to model the realities of conservation work – for instance, making decisions in times of uncertainty, working effectively to achieve consensus among diverse stakeholders, and integrating a variety of information types and sources to arrive at solutions.

The following suggestions may be useful for exercise development:

- **Identify a key question.** Effective key questions are both relevant to the real world of conservation and can be addressed given the time and resources available to students. Good key questions force students to bring concepts and principles to bear on realistic applications.
- **Foster active investigation and participation.** Students can investigate key questions by obtaining and synthesizing information and data, performing experiments or simulations, debating, and role-playing, for example.
- **Produce a tangible product.** Following their investigations, students develop a product that demonstrates their knowledge of the topic. This can be a mechanism for acquainting students with standard forms of communication within the field of conservation (e.g., how to write a scientific paper or editorial, how to make an oral presentation, how to engage in debate). The process of synthesizing and integrating information to produce a final product should be challenging and meaningful as well as indicative of a student's comprehension, skill, and effort.
- **Encourage evaluation and reflection.** At the end of the exercise, ask students to evaluate what they have gained from completing the exercise, and how the exercise could be improved for future use. Ask what additional questions have been generated by the exercise, and encourage students to refine the initial key question.

Useful examples of inquiry-based learning exercises can be found in:

Problem-solving in conservation biology and wildlife management (Gibbs et al. 1998), and in Conservation Biology with RAMAS EcoLab (Schulz et al. 1999).

Gibbs, J. P., M. L. Hunter, Jr., and E. J. Sterling. 1998. Problem-solving in conservation biology and wildlife management. Blackwell Science, Cambridge, Massachusetts, U.S.A.

Shultz, S.M., A.E. Dunham, K.V. Root, S.L. Soucy, S.D. Carroll, and L.R. Ginzburg. 1999.
Conservation biology with RAMAS EcoLab. Sinauer, Associates, Sunderland, Massachusetts,
U.S.A.

EXERCISE SOLUTIONS

This document accompanies all exercises and serves as a guide for instructors on how to prepare for and carry out the exercise in class, as well as evaluate results. The exercise solutions may also include questions or discussion points that provide direction to the exercise. Example material from Exercise Solutions include:

- Time required for each exercise section or component
- Suggestions for the best time to do the exercise (e.g., some outdoor exercises might be suited to certain times of day/year)
- Suggestions for how students should work (e.g., students work individually, or in pairs, or in larger groups; students work in small groups and then convene into larger discussion groups, etc.)
- Notes on how the exercise can be adapted for use in different environments (e.g., notes on what structure to use as a class-based exercise, or as an out-of-class assignment, etc.)

For more ideas on what to include in the exercise solutions document, see NCEP modules or the inquiry-based learning exercises in [Problem-solving in conservation biology and wildlife management](#) (Gibbs et al. 1998).

ASSESSMENT TOOLS

If appropriate to the exercise (or case study in some cases), the author should include any tips and tools to evaluate student learning by both the instructor and students. The Assessment Tools could be an example quiz, pre and post content questions, a rubric for a paper or presentation, or answers to discussion questions that the student should be able to complete in a comprehensive way, either in written form or verbally.

PRESENTATIONS

NCEP presentations not only provide instructors with novel visual material to integrate into their curricula, they come with notes and advice on how to incorporate active teaching methods into their lectures. In addition to PowerPoint format, we encourage authors to submit files or links to other media, such as professionally developed simulations, videos, or audio files that enhance teaching of the conservation topic.

CONTENT

The presentation file should provide a collection of materials that an instructor can use to compile a lecture (or series of lectures) on the module topic. Therefore, the emphasis for the presentation file is on visuals (photographs, maps, graphs, charts, tables) that effectively illustrate, in a logical and ordered sequence, the main points and concepts covered in the

synthesis and any accompanying literature files. Module authors are encouraged to provide additional material where a longer lecture or a series of lectures is appropriate.

STYLE

NCEP PowerPoint presentations have a standardized format; we provide authors with the template (see *NCEP Module Style Guide*). The introduction to the presentation should clearly outline the goals and content of the presentation. All of the information provided should be as clear, concise, based on solid evidence, and refer to published research. The language used must be appropriate, efficient, and never excessive. As a general rule, authors should avoid slides that contain only text, and **use no more than 25 words** (preferably fewer) on a single slide. The presentation should end with a conclusion section that reviews the main topics and "take-home" messages for students; authors should avoid sudden or truncated endings.

Useful tips on how to create effective presentations can be found at:

- http://www.oakland.edu/upload/docs/CETL/WorkshopPPTs2014/effective_powerpoint_s_CETL_REV.pptx

IMAGES

Any visual materials included in the presentation file should have explicit permission for use. Images should therefore be from the module author's own files or obtained from a website that offers copyright-free images (see the *NCEP Module Style Guide* for a list of recommended image sources).

PRESENTATION NOTES

Module authors should prepare a set of notes that serve as an instructional guide for using the presentation file in a classroom. It is particularly important to provide explanatory notes for each slide and explanations for images, figures, tables, etc. Suggestions to adapt the presentation for use in diverse locales are also helpful.

ACTIVE TEACHING METHODS

Module authors should provide a set of questions or activities to can make lectures interactive through class discussion or other techniques, such as brainstorming before introducing definitions, or think-pair-share. Existing modules, such as "What is Biodiversity?" contain good examples. Some questions may be directed at developing key concepts that are illustrated by the images, figures, and tables in the presentation file. Other questions may be designed for use after the lecture or exercise, to promote further exploration of the topic and consideration of additional points not covered in the module. As with all module components, our target audience for discussion questions is the undergraduate level; however, we welcome discussion questions generated for the graduate or practitioner level as well.

The Presentation Notes, Case Study Teaching Notes, and Exercise Solutions with associated Assessment Tools will be made available through **restricted, registration-only, online access** so that instructors can limit student access to the notes and solutions.

CIVIC ENGAGEMENT

When appropriate, authors are encouraged to include links to initiatives through which students can engage in broader impacts related to the module topic. For example, authors could carefully review and include any professional activities in current conservation related to the module topic that engage the public to take action through either physical participation or civic engagement. Authors must submit a brief explanation of the action and how it relates to the module, as well as any appropriate links. NCEP leaves the initial proposal of these activities to the author's discretion, but reserves the right to review and make the final selection of suggested citizen engagement links to be included in the final published module.

Credible sources of citizen engagement opportunities include: citsci.org, whitehouse.gov, recognized non-profit organizations (501c3s) including the Nature Conservancy or the Center for Natural Lands Management, or use of a smart-phone apps like iNaturalist.

RECOMMENDED OPEN ACCESS SOURCES

Authors are encouraged to submit 1-5 open source e-learning resources that enhance their module or replace a module component (i.e. an open source case study to accompany a synthesis). We especially welcome resources created by the authors themselves or through collaborative projects. We expect resources to be carefully selected, professionally developed, and from a reputable source such as governments, universities, or registered non-profits, with NCEP editorial oversight.

NCEP materials are professionally developed and peer-reviewed and we expect the same qualities to extend to open access resources linked to our modules. Below are recommended and example sources of open access resources for module components. This list is not meant to be exhaustive, but suggestive of sources we approve for NCEP modules.

SYNTHESIS

- Open Access Journals
- PLoS One, Ecology and Society, Conservation Evidence
- Nature Education (http://www.nature.com/nature_education)
- See the Directory of Open Access Journals: <http://doaj.org/>
- Reports developed by the IUCN or UN or UNDP

CASE STUDIES

- Open Access Journals (as above)
- Equator Initiative Case Studies
- National Center for Case Study Teaching in Science (<http://sciencecases.lib.buffalo.edu/cs/>)
- Case studies developed by the IUCN or UN or UNDP

MEDIA

- American Museum of Natural History (www.amnh.org/explore/science-bulletins)
- National Academy of Sciences (<http://nas-sites.org/teachers/>)
- Science: Science Live (<http://news.sciencemag.org/sciencealive>)
- NASA (<http://www.nasa.gov/audience/foreducators>)
- International Union for the Conservation of Nature (<http://www.iucn.org/knowledge/multimedia/video/>)

EXERCISES

- National Center for Case Study Teaching in Science (<http://sciencecases.lib.buffalo.edu/cs/>)
- Nature Education (http://www.nature.com/nature_education)
- National Academy of Sciences (<http://nas-sites.org/teachers/>)

CIVIC ENGAGEMENT

- Citsci.org
- Whitehouse.gov
- The Nature Conservancy (<http://www.nature.org/how-we-work/get-involved-with-tnc.xml?intc=nature.tnav.how.left>)
- iNaturalist (<https://www.inaturalist.org/>)

To submit open access resources, please include the name, hyperlink, a brief description, and any testimonial, such as if you have used it and why you find it appropriate for use in a classroom setting.

NOTE ON PLAGIARISM

Plagiarism is taking someone else's ideas and words and passing them off as your own. Citing a source but still using their words verbatim is still considered plagiarism, and thus dishonest. While plagiarism can occur unintentionally, NCEP has zero tolerance for plagiarism and authors should be mindful that all components submitted to NCEP are expected to consist of original material, except citations or excerpts that are explicitly noted as such. Using available software, we check submitted module components for plagiarism at random. If plagiarism is detected in a submitted module, depending on the extent of the plagiarism, we either return it to the author for revision or reject it outright.

LICENSE AGREEMENT

FOR YOUR REVIEW ONLY – TO BE COMPLETED AFTER CASE STUDY/MODULE IS FINISHED

Dear XXXXX:

I am writing to ask permission to use CASE STUDY/MODULE TITLE (herein the Work) in an educational product of the American Museum of Natural History.

The Work would be used as part of the educational project the *Network of Conservation Educators and Practitioners* (NCEP) of the Center for Biodiversity and Conservation (CBC) of the American Museum of Natural History (AMNH). Further information about NCEP can be found at <http://ncep.amnh.org>. A tangible product of NCEP is a set of teaching modules for conservation biology presented in print and electronic form, which are distributed without charge for educational use by educators and trainers in a number of countries and in a number of languages across the world. Modules or module components may also be distributed via CD-ROM/USB drive, and eventually may become part of the online journal "Lessons in Conservation."

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You will continue to own the copyright of the Work, however, the Museum will own the copyright in the teaching modules as a collective work of original authorship. The Museum will credit you as author of the Work in all uses.

Cordially,

Project Director, Network of Conservation Educators and Practitioners

Agreed and accepted: _____

Date: _____ Contact information (email or phone): _____