APPENDICES

Appendix A: Writing SMART Objectives

Effective program development and implementation depends on the clear articulation of goals and objectives. While goals provide a vision and overall description of the program, objectives chart expected outputs and outcomes. In writing meaningful objectives, many program developers have found a set of criteria, summarized by the acronym SMART, to be helpful. A SMART objective is:

Specific - Describes an action, behavior, outcome, or achievement that is observable.

Measurable - Details quantifiable indicator(s) of progress towards meeting the goal (e.g., 70% of participants..., five or more...).

Audience - Names the audience (e.g., workshop participants, community members) and describes outcomes from the perspective of the audience (i.e., what the audience will be able to do).

Relevant - Is meaningful, realistic, and ambitious; the audience can (given the appropriate tools, knowledge, skills, authority, resources) accomplish the task or make the specified impact.

Time-bound - Delineates a specific time frame.

Specific action words that describe what the learner will be able to do as a result of participating in the program are used in writing SMART objectives. Action words can help to categorize types of learning in a hierarchy ranging from simple to complex. For example, analysis is a different level of learning than is application. One of the best known tools for developing objectives is the 1956 publication *Taxonomy of educational objectives: The classification of educational goals. Handbook I. Cognitive Domain* by Benjamin Bloom and a team of educational psychologists. The *Taxonomy* categorizes six levels of learning that commonly occur in education settings: knowledge, comprehend, apply, analyze, synthesize, and evaluate. (See the following table for some of the verbs that could be associated with each of the six levels of learning.)

Examples of Action Words Used to Help Set Objectives for Different Levels of Learning					
KNOWLEDGE	**COMPREHEND**	**APPLY**	**ANALYZE**	**SYNTHESIZE**	**EVALUATE**
define	discuss	demonstrate	distinguish	design	appraise
record	explain	employ	debate	construct	assess
list	differentiate	illustrate	calculate	create	judge
name	identify	translate	diagram	propose	predict

Appendix B: Using Rubrics

Designing meaningful assessments of learning is essential to the development and implementation of effective nonformal environmental education programs. Assessments allow us to gauge whether expected learner outcomes have been achieved. Many educators have found the use of rubrics to be a valuable tool when assessing learner outcomes. Rubrics can be thought of as a logical extension of program and instructional objectives. With a well-written rubric, it is reasonable to expect that all performances will be measured with the same yardstick. Additionally, when rubrics are used, learners know what is to be expected of them.

SAMPLE RUBRIC:

Taking water samples

SCORE	SAFETY: Degree to which learner follows correct safety procedures	PROCEDURES: Degree to which learner follows proper mechanics in water quality analysis	RESULTS: Degree to which learner obtains proper sample values	INTERPRETATION: Degree to which learner develops likely hypotheses
4 Fully meets standards	Handles chemicals and glassware safely.	Obtains uncontaminated samples and follows correct steps for pH analysis.	Both samples within .3 points of the correct pH.	Can list three plausible reasons why the pH of the two samples differs and can defend reasoning behind hypotheses.
3 Partially meets standards	No serious safety issues during analysis, but procedures deviate from ideal.	Has some problems following instructions, but procedure adequate for approximate correct test results.	One sample within .3 points of the correct pH.	Can list two plausible reasons why the pH of the two samples differs and can defend reasoning behind hypotheses.
2 Major departure from some aspect of standards	Shows some concern or knowledge about safety issues, but is careless in handling materials.	Major problems with procedures that will likely yield incorrect results.	Neither sample within .3 points, but at least one sample within .5 points.	Can list one plausible reason why the pH of the two samples differs and can defend reasoning behind hypothesis.
1 Does not meet standards	Disregards safety concerns when handling materials.	Does not follow necessary steps in analysis and cannot obtain useful results.	Neither sample within .5 points.	Cannot list even one plausible reason why the two samples differ.

Appendix C: Working with Adult Learners

Understanding the audience is essential to the success of an environmental education program, particularly when working with adult learners.

Adult Learners...
...need to feel physically and mentally comfortable during learning experiences. *Avoid situations where self-esteem could be harmed.*
...often participate in nonformal learning for social reasons. *Include opportunities to interact with others and to discuss ideas.*
...enjoy learning from peers and bring considerable and diverse life and learning experiences. *Differing life stages and viewpoints should be honored, accommodated, and utilized to increase learning.*
...create personal meaning and understanding from learning. *Build in opportunities for active learning and allow time for participants to reflect individually on their learning.*
...want to know how information presented is relevant and applicable in their personal and professional lives. *Build in opportunities to apply learning.*
...are voluntary participants and prefer self-directed learning. *Programming should be focused, yet flexible enough for adults to take away what is best suited to their needs. Involve participants in setting educational goals. Clarify expectations.*
...enjoy active learning and direct participation. Involve participants in discussions and hands-on activities. *Avoid long lectures and periods of sitting.*
...make a conscious decision to participate in a learning situation and are guided through an experience by their motivation to learn. *Adults are aware of their learning.*
...need to feel a sense of equality and respect in order to fully appreciate an experience. *Treat adults as equals.*

Appendix D: What You Need to Know About Children Under Six

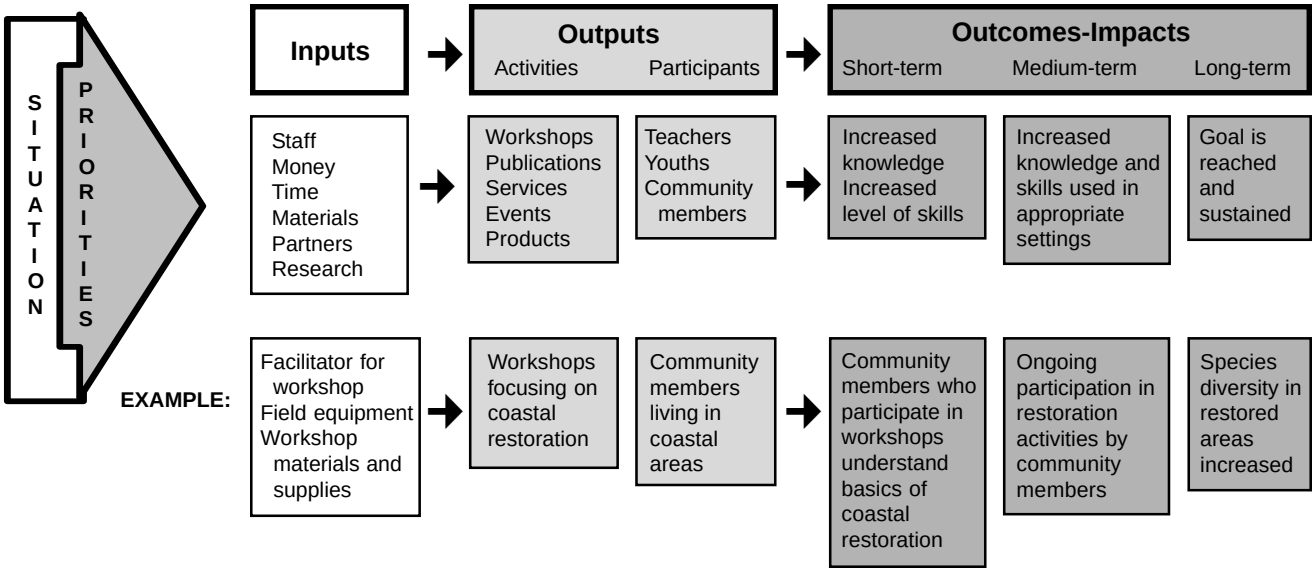
What you need to know about children under six	What you can do to help them learn and grow
They think differently than we do. Concrete thinkers. No concept of time. Appearance is reality. Cannot think logically or abstractly. Think inanimate objects have feelings, thoughts, and desires. Can think of only a few things at one time.	Choose topics relevant to their lives and limited experience. Choose concrete topics—clouds, not weather; squirrels, not mammals. Use simple language—avoid clichés. Use mystery, puppets, etc., to capture attention. Avoid referring to the past or future. Give one or two directions at a time and repeat activities.
Everything is about "Me!" Think everyone thinks, feels, and acts like they do. Rigid sense of equality and fairness. Unable to distinguish between intentional and unintentional acts.	Use puppets, costumes, and dramatic play to give children a change of perspective. Make sure everyone can participate to the same extent. Provide enough time and materials for everyone.
When in doubt, they make it up. They construct their own understandings of how the world works. Develop their own theories about the world based on prior knowledge and experience.	Instead of correcting inaccurate information, find out why they think what they do. Use open-ended questions to challenge them to think in different ways. Facilitate learning rather than teach facts.
They can do it themselves! Learn best when they can decide for themselves what, when, and how to do things.	Provide lots of materials for experimentation. Provide choice whenever possible. Provide enough time and space to explore things thoroughly.
They are learning about everything all at once, all the time. Learning occurs through every domain—social, cognitive, physical, emotional, and so forth. Playing is learning.	Integrate natural concepts in with social play, material manipulation, and hands-on experimentation. Incorporate movement into programs.
They make sense of their world through play. Like to experience new things in familiar ways and familiar things in new ways. Approach materials in four stages: awareness, exploration, inquiry, and utilization.	Use familiar stories, songs, nursery rhymes, and so forth, but add a new verse or twist. Don't jump into teaching facts before children have had a chance to explore and experiment.

From *Natural Wonders: A Guide to Early Childhood for Environmental Educators.* Marcie Oltman, editor (2002). MN: Early Childhood Environmental Education Consortium. Reprinted with permission from the Minnesota Children's Museum and the Minnesota Office of Environmental Assistance.

Appendix E: Logic Models as a Tool for Program Development and Evaluation

The logic model provides a visual representation of the program and its evaluation. The logic model illustrates the relationships among the various program components: initial situation (e.g., degraded coastal areas with declining numbers of species), identified priorities (e.g., restoring coastal areas, increasing species diversity); inputs (i.e., resources needed to accomplish a set of activities); outputs (i.e., activities designed to accomplish the program goal, as well as the audiences that participate in those activities); and short-term (immediate), medium-term (2-3 years), and long-term (4-10 years) outcomes-impacts. The logic model can help guide program planning, implementation, and evaluation. It can serve as a tool for clarifying program elements, identifying evaluation questions and indicators, and conducting ongoing self-evaluation.

Logic Model, Evaluation Questions, and Indicators



Evaluation Questions: What do you want to know?

Were the inputs sufficient and timely? Did they meet the program goals?	Did all activities occur as intended? What was the quality of the intervention? Was the content appropriate?	Did targeted community members participate? Who did not participate? Who else was reached?	Did knowledge increase? Did understanding of coastal restoration techniques increase? What else happened?	Are community members continuing to participate in restoration activities? Are they participating in other activities?	To what extent has the biodiversity of the targeted coastal area been increased? In what other ways has ecosystem quality increased?

Indicators: How will you know it?

# staff; $ invested; Delivery timetable	# workshops scheduled; Publications printed; # events	Actual vs. desired attendance; #, % that attended per workshop or session	#, % with increased knowledge of coastal restoration; Additional outcomes: +, -	#, % using new knowledge and skills to monitor progress of restoration activities; Additional outcomes: +, -	# of species recovered; Other positive environmental benefits; Additional outcomes: +, -

Adapted from Taylor-Powell, E., Jones, L. & Henert, E. (2002) Enhancing Program Performance with Logic Models. Retrieved December 1, 2003, from the University of Wisconsin-Extension web site: www.uwex.edu/ces/pdande/evaluation/pdf/WaterQualityProgram.pdf.