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PEOPLE, RULES AND ORGANIZATIONS SUPPORTING THE
PROTECTION OF ECOSYSTEM RESOURCES

Primary School Environmental Education Curriculum Review

June 2016

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People, Rules and Organizations Supporting the Protection of Ecosystem Resources (PROSPER)

Primary School Environmental Education Curriculum Review (Draft)

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DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

Acronyms

AML	Arcelor Mittal Liberia
AYP	Advancing Youth Program
CDWG	Curriculum Development Working Group
CEO	County Education Officer
CI	Conservation International
DEO	District Education Officer
EE	Environmental Education
EPA	Environmental Protection Agency
FDA	Forestry Development Authority
FFI	Fauna and Flora International
IRD	International Relief and Development
LPT	Lesson Planning Team
MCSS	Monrovia Consolidated School System
MoE	Ministry of Education
NAEAL	National Adult Education Association of Liberia
NPS	National Primary School
NRM	Natural Resources Management
UNICEF	United Nations International Children's Emergency Fund

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INTRODUCTION

Tetra Tech ARD was contracted by USAID in May 2012 to implement the People, Rules and Organizations for the Protection of Ecosystem Resources (PROSPER) program. The goal of the five-year program is to “introduce, operationalize, and refine appropriate models for the community management of forest resources for local self-governance and enterprise development in targeted areas.” That goal is to be achieved through the accomplishment of three major objectives:

- Expanded educational and institutional capacity to improve environmental awareness, NRM, biodiversity conservation, and environmental compliance
- Improved community-based forest management leading to more sustainable practices and reduced threats to biodiversity in target areas.
- Enhanced community-based livelihoods derived from sustainable forest-based and agriculture-based enterprises in target areas.

An important activity under the first objective is to support the development of environmental education content for Liberia’s primary school curriculum. PROSPER’s approach to this activity involves close collaboration with the Ministry of Education (MoE), which is responsible for national curriculum and education standards.

Activity 1.1: Collaboratively support the development and/or modification of primary formal and non-formal curricula to improve knowledge and understanding related to natural resources, their management, and the related responsibilities of government and citizens.

In cooperation with curriculum development specialists identified by the Ministry of Education, PROSPER developed seventy-two lesson plans for grades 1 through 6, covering the four main subject areas – Science, Social Studies, English and Mathematics. The lesson plans include detailed lesson descriptions, lists of resources, learning objectives, key concepts and methodologies for evaluating students’ understanding thereof.

The environmental education curriculum development process involved multiple stakeholders including the MoE, EPA, FDA, and civil society organizations. Beginning in March of 2016, PROSPER initiated a review of the curriculum materials. The review included an examination of the curriculum based on recognized best instructional practices in the environmental education field. Also, interviews were conducted with teachers who had been trained with the environmental education curriculum in November of 2015. Eight teachers from the Buchanan area schools, seven teachers from the Tappita area schools, and thirteen teachers from the Sanniquellie region were interviewed for their feedback on the curriculum. Both the analysis of the curriculum and the interviews provide significant information concerning the areas of strength and potential areas of growth for the curriculum materials.

CURRICULUM DEVELOPMENT PROCESS

It is critical to have some understanding of the process which created the curriculum materials prior to the review. The scope of the curriculum was restricted by decisions made by the Curriculum Development Working Group (CDWG), Ministry of Education (MoE) officials and the obstacles inherent with educating students in the rural areas of Liberia. PROSPER began the process of curriculum development with the theory that if schools adopt and teach a curriculum focused on improving knowledge of natural resources in Liberia then students who are taught will make better decisions related to natural resource management because they will understand the consequences of poor management and have knowledge of options to improve Natural Resources Management (NRM). With this as their impetus, PROSPER worked with the MoE to form the CDWG which brought together private sector partners, representatives from the Environmental Protection Agency, Forestry Development Authority and other implementing partners involved in education or NRM. The group decided on the following goals for the curriculum:

1. Instilling passion in children to explore their environment;
2. Inspiring children to be creative, innovative and respectful in their thinking about the environment;
3. Empowering children to influence others in their community and provide leadership to protecting Liberia's unique natural environment; and
4. Promoting integrity, openness, and gender equality for all students and the community at large.

Also, the group decided to only choose themes that fit within the national curriculum so that the lessons would not increase the prevailing curricula load levels in terms of content, teacher support materials, and the number of instructional hours required to deliver them. Although this was an important decision to ensure teacher support, it had a profound impact on the final version of the curriculum. Environmental themes and the lessons had to be tailored to the existing National Curriculum (NC) which limited the number of themes that could be used since connections to many important environmental themes could not be found in the NC. Of the 51 themes identified by the CDWG as important, 27 were in the NC, while the remaining 24 were recommended for integration. Therefore, almost half of the environmental themes considered as highly important or of high priority by the CDWG were not developed into lessons since they could not be aligned with the existing objectives in the NC.

Once the CDWG agreed on the themes, a consultant from Rutgers University was hired to create a curriculum framework for the themes that were found to align with the NC. Many of the instructional suggestions from the consultant were creative and based on best practices but they either did not fit within the national curriculum or were not adaptable to the Liberian context. The CDWG chose to leave the exact placement of the environmental themes to the MoE and decided that the most sustainable approach would be to have Liberian teachers develop the lesson plans in collaboration with MoE officials. Eventually, six Liberian teachers were recruited to create the lessons under the supervision of MoE officials and a curriculum specialist from PROSPER. This group comprised the Lesson Planning Team (LPT). The following steps characterized the lesson plan development process:

1. The environmental education curriculum framework produced by Rutgers University for grades 1-6 produced was reviewed for the integration process.
2. The national primary school curriculum was reviewed and environmental themes were identified.

3. Various lesson plan formats being used in Liberia’s primary schools system were analyzed and a consensus reached for the development of a standardized format that was used to develop illustrative lesson plans with environmental themes.
4. Appropriate teaching and learning materials and teaching aids to support the classroom environment for each lesson plan were identified and described.
5. According to their core subject of specialization (Science, Social Studies, Mathematics and English), each of the six teachers developed three lesson plans.

The group collaborated well together and after a review of the national curriculum quickly realized that it faced a number of challenges:

1. The national primary curriculum for Grades 1-6, in the core subject areas – science, social studies, mathematics and language arts – is very general. It is more of a list of topics to be covered by subject, marking periods and year.
2. It does not provide lesson plans, nor does it always have clear objectives for specific lessons with accompanying learning activities to provide support to the teacher in the classroom.
3. It provides no guidance to teachers for week-to-week nor day-to-day lesson presentations.
4. The curriculum sometimes suggests lesson teaching aids. For example, Science, Grade 3, Marking Period I refers to “an aquarium life” under materials, but it is up to the teacher to find the materials.

In conjunction with the work of the LTP, another group was created to complete a rapid assessment of the schools that could potentially pilot the new curriculum. The survey revealed a number of findings. First, there were problems of consistency between prescribed texts and topics to be taught in the MoE curriculum. Also, teaching and learning materials were not available in the schools – textbooks, charts, posters, chalk, pens, pencils, notebooks/copybooks. Most teachers and support staff are not on the MoE payroll, even those that have spent 10 to 15 years in the field. And there were very few teachers that had undergone any form of formal teacher training among the schools. All of this information was communicated to the LPT to better inform the development of the new curriculum.

Once the lessons were created, the CDWG organized pilot testing workshops in Buchanan, Tappita and Sanniquellie. The workshops included administrators, teachers and students. The teachers were asked to review the lessons using a specific criteria and eventually taught demonstration lessons to groups of students. Both the teachers and the students were surveyed for their feedback on the lessons. As a result of teacher feedback, the following changes were made to the lesson plans:

1. Learning points were enhanced to give teachers more background knowledge;
2. Suggestions on how to activate the prior knowledge of students were added;
3. Summary/Conclusion sections were added to the lessons;
4. Suggested dialogue between teacher and students were written into the lessons, color coded into blue and red; and
5. More visual materials such as posters, charts and flashcards were developed to support the lessons.

Modifications based on this feedback were made to the lessons and a second pilot test was conducted to ensure that the revised lessons could support teachers in both urban and rural areas of Liberia. Once this was complete, the final version of the lesson plans were handed over to the MoE for distribution and PROSPER supported the Ministry in conducting a final training for teachers in November of 2015.

The entire curriculum development process spanned nearly three and half years and revealed a number of the challenges which arise when developing a curriculum in the Liberian context. The lessons were limited in scope by the existing objectives in the NC. MoE officials insisted on certain alterations which impacted different components of the lesson plans. The capacity of the Liberian teachers and the supply of materials in Liberian schools, particularly in rural areas, put limitations on the content of the lessons. All of these factors must be taken into considerations when reviewing any curriculum developed for the Liberian students attending public schools.

CURRICULUM ANALYSIS

This curriculum takes a cascaded approach that begins with a foundation of students' appreciation of nature and the environment in Grades 1 and 2 (Communicating with Nature). Grades 3 and 4 (Environmental Awareness) builds on this enthusiasm with increased focus on the environment, ecology, forestry, and the world around them, and finally, in Grades 5 and 6 (Environmental Threats and Opportunities); the overarching theme is how children can make a difference with environmental issues once they are knowledgeable and can be empowered to become environmental champions in their community. This approach enhances but does not replace environmental themes that exist in the primary school curriculums. Most of the environmental themes in the curriculum are grouped together at age appropriate levels that are focused on introducing basic concepts, definitions and terminology and on experiential learning by students as a vehicle to recognize, respect and generate creativity, imagination and active learning exercises while still providing a Liberian oriented approach to environmental awareness. The curriculum was also enhanced by incorporating instructional aids recommended by teachers and administrators who attended the first pre-testing of the materials.

The review of the curriculum materials took place under three overarching categories (see Annex: Curriculum Evaluation Grid). First, each of the 72 lessons was checked to make sure that it aligned with the environmental theme for its grade level. Then the lessons were examined based on the lesson structure and the recommendations from the pre-testing sessions. This review included an examination of how well the lesson aligned with the National Curriculum (NC), whether or not the objective was measurable, the depth of instruction provided to the teacher, and the inclusion of illustrative materials. Finally, the lessons were evaluated based on their inclusion of acknowledged best practices from the environmental education field. The practices used in this review included active participation, hands-on observation and discovery, place-based learning, cooperative/group learning, outdoor instruction, data collection, relevance, reflection, issue-based learning, and multiple points of view. All 72 lessons were evaluated within these categories to see how they aligned with best practices as well as met the needs of the Liberian classroom.

The majority of lessons (67 out of 72 lessons) aligned with the three overarching themes established by the CDWG. For example, the 4th grade math lesson *Addition and subtraction of population data* deals directly with the question of population growth. Also, the 4th grade English lesson *Developing and acting out a story* asks the students to participate in a roleplay focused on a land disputes. The 3rd grade social studies lesson *How urban and rural communities depend on each other* challenges students to identify the links between different communities in Liberia. Each of these lessons are examples of how there is alignment between the lessons and the overarching themes. However, there are five lessons which did not make the connection to the environmental themes selected by the CDWG. The 1st grade lesson *Identifying others as members of a family*, the 5th grade English lesson *Using literary terms*, the 5th grade math lesson *Equivalent fractions*, the 6th grade math lesson *Add, subtract, multiply and divide in English and metric systems*, and 6th grade math lesson *Fractions from whole numbers* fail to align with the appropriate environmental theme or communicate an environmental message.

Each of the 72 lessons aligned with objectives within the NC. None of the lessons deviated from what teachers are expected to teach throughout the school year. This matches perfectly with the CDWG's desire not to increase the prevailing curricula load levels in terms of content, teacher support materials, and the number of instructional hours required to deliver them.

Lesson objectives are critical since they guide the learning for the entire class. Of the 72 lessons reviewed 53 were found to have measurable objectives. The lessons that contain weak objectives include

objectives which do not give a specific measurable criteria such as the 5th grade English lesson *Identify and use literary terms*. This lesson's objective reads, "Identify and use literary terms" but does not stipulate the number of terms which need to be mastered by the end of the 45 minutes class. Other objectives which do not meet standard use unmeasurable terms to describe the learning. For example, the 4th grade English lesson *Developing and acting out a story's* objective states, "Have a greater awareness of land issues..." and the 4th grade science lesson *Classification of animals* has an objective which reads, "Appreciate that there are two classes of animals." Both of the terms "awareness" and "appreciate" are not measurable and should not be used for objectives. This issue was raised during an interview with a CDWG member and they explained that a MoE representative insisted on using the terms while the lessons were being developed. These objectives need to be reviewed and amended to better support teachers and students.

The vast majority of the lessons (67 out of the 72 lessons), provide a significant amount of support for teachers. Most lessons contain a lengthy set of instructions which allows teachers to have a clear picture of how to deliver the lesson. In addition to the instructions, many lessons provide suggested questions for teachers to use and the possible responses they can expect from students. These areas of dialogue are highlighted in blue and pink so the teacher can easily reference them while they are teaching. The 1st grade science lesson *Composition of the earth*, which contains 23 steps in the procedures section, is a perfect example of how the lessons offer teachers a significant amount of support in their instructional practice. However, there are some lessons which need to be enhanced to better support instruction. The 1st grade science lesson *Characteristics of living things* contains only 9 steps of instructions and the 3rd grade English lesson *Statements and questions* asks teachers to describe the concept of an ecosystem without providing the teacher with any background information. These lessons need to be enhanced with more directions and information provided to the teacher.

Feedback from the rapid assessment and the pilot testing clearly indicated that teachers, particularly in rural schools did not have access to materials which help to illustrate the academic content. As a result, the LTP created posters and flashcards to help provide concrete examples to abstract concepts and enhance student comprehension. Typically (62 out of the 72 lessons) the connection between the lesson and the illustrative materials is very clear. The 5th grade math lesson *Finding percent of a number* is directly connected with a poster of various groups of animals which allows the student to better understand the concept of percentages. However, in certain cases the reference to the illustrative materials is difficult to grasp. The 6th grade social studies lesson *Compare the environment and climatic conditions of Liberia with her neighbors* references a poster but the table does not have the deforestation rates needed for the lesson. The 2nd grade math lesson *Place values* references a poster, "Mathematical chart with numbers 1-100" but this is not at the end of the lesson. It would be beneficial for these lesson materials to be reviewed and modified to make sure they are consistent with the directions in the materials.

The last portion of the curriculum review process focused on recognized best practices in the field of environmental education. These practices are believed to contribute to enhancing the environmental literacy and equip students with what they need to effectively analyze and address important environmental problems. However, it is important to remember that the amount of time for each lesson is restricted to 45 minutes and that the depth of the lessons are limited by the age of the students, the framework of the NC, the decisions made by the MoE officials during their review process, and the capacity of Liberian teachers to deliver the lesson. A greater number of these best practices were incorporated into the initial draft of the lessons but were winnowed down to make them appropriate for the Liberian context.

Active Participation (71 out of 72 lessons) includes lessons where students are actively involved in the education experience, not just passive receivers of verbal or visual information or communication.

Examples of this practice include:

- 1st grade English lesson *Singular and plural nouns*: Students clap once for a singular noun and twice for a plural noun.
- 6th grade social studies lesson *Environmental and climatic conditions of Liberia and her neighbors*: The teacher is prompted to constantly ask students to give examples and share their opinions
- 3rd grade science lesson *Definition of matter and the forms of matter*: Students are asked to create a list of different types of states of matter and share them with the class

Hands-on observation and discovery (16 out of 72 lessons) gives the students the opportunity to physically manipulate the environment in some way to explore a concept.

Examples of this practice include:

- 1st grade math lesson *Reading and writing numbers up to 20*: Students are asked to group objects into different number groups up to 20. Also, students are asked to draw different animals in different number groups up to 20
- 5th grade science lesson *Soil needed for plant growth*: Students are touching and examining different types of soils.
- 3rd grade science lesson *Environment*: Students bring examples of one living and one non-living thing to the class.

Place-based learning (64 out of 72 lessons) is an educational program grounded in the particular attributes of the place using natural and community systems as the context for learning.

Examples of this practice include:

- 1st grade social studies lesson *Living things (Man and Animals)*: Students are asked to list the animals in their environment and then explain how they are different and similar
- 5th grade math lesson *Finding means (Averages)*: Students use a chart listing the numbers of local trees to calculate means
- 2nd grade lesson *Clothing*: The visuals in this lesson show clothing that is found in Liberia and students discuss the reasons for difference types of clothing in their community

Project-based learning (6 out of 72 lessons) engages students in evaluating a real-world environmental problem and making an informed plan to address the issue.

Examples of this practice include:

- 6th grade social studies lesson *Compare the environment and climatic conditions of Liberia with her neighbors*: There is a class project which asks students to consider the actions that they could take to bring the issue of deforestation to the attention of the authorities
- 5th grade science lesson *Soil needed for plant growth*: Students are asked to determine which soils are best for plants by planting the same type of plant in different soils to decide which locations are the best for farming.
- 1st grade social studies lesson *How man has influenced the environment*: Students are asked to create a class activity to observe World Environment Day.

Cooperative/group learning (12 out of 72 lessons) environments require students to work with others, either through group discussions or active participation in an investigation.

Examples of this practice include:

- 3rd grade math lesson *Associative property of addition and multiplication*: Students are asked to swap exercise books and discuss their answers so that they can present an answer on the board.
- 4th grade math lesson *Addition and subtraction of population data*: Students work in groups to create sample questions to present to the class.
- 4th grade English lesson *Descriptive adjectives*: Students work in groups to create charts of descriptive adjectives and present them to the class.

Outdoor Instruction (10 out of 72 lessons) occurs when all or a portion of the class occurs outside.

Examples of this practice include:

- 6th grade science lesson *The Liberian Forest*: Lesson suggests that the teacher take the students outside to a shaded area for this lesson.
- 1st grade English lesson *Speaking Fluently*: The teacher asks the students to go out and observe how different animals behave in the surrounding environment.
- 6th grade math lesson *Concept of space/measure lines; rays and angles*: Students are asked to go out in the surrounding area and identify different geometric shapes and properties.

Data collection (10 out of 72 lessons) describes the scientific collection of data during a class lesson.

Examples of this practice include:

- 1st grade math lesson *Measuring length*: Students are asked to collect data in regards to length of tables, chairs, their height, and the length of their feet.
- 3rd grade science lesson *Weather (Rainy and Dry Seasons)*: Students are asked to place a thermometer outside the classroom and collect temperature data and create a rain gauge out of a plastic bottle to collect rainfall data.
- 5th grade math lesson *Finding means*: The teacher asks students to count the types of animals or trees in the community and find the average by type of the animal or tree.

Relevance (66 out of 72 lessons) is when the content explicitly references or makes connections to students' experiences outside of the realm of instruction.

Examples of this practice include:

- 1st grade social studies lesson *Living Things*: The lesson asks students to name animals living in their environment and then explain the differences between these animals.
- 5th grade science lesson *Characteristics of plants*: The lesson revolves around the characteristics of plants in the area that a teacher or students can bring into the classroom.
- 3rd grade English lesson *Consonants and Vowel Sounds*: The teacher asks students to give examples of words from their environment that begin with a consonant sound.

Reflection (65 out of 72 lessons) in a lesson allows students the opportunity to reflect on their past experiences or the new shared experiences from the lesson.

Examples of this practice include:

- 2nd grade social studies lesson *Physical features of Liberia*: During the discussion the questions ask the student to reflect on why the rivers or Lake Piso are important.
- 5th grade math *Equivalent fractions*: In the dialogue box, the lesson prompts the teacher to always ask students not just for the right answer but how they arrived at the answer as well.
- 6th grade science *Classification of plants*: Asks students to reflect on what they learned and how it changes their view of the local environment.

Issue-based learning (18 out of 72 lessons) invites students to focus on real-world environmental issues, their consequences, and possible solutions.

Examples of this practice include:

- 6th grade science lessons *The Liberian forest*: Asks student to list the benefits of the forest and the need to prevent deforestation.
- 5th grade social studies lesson *Problems facing Liberian agriculture*: This lesson asks students to consider their own experiences with agriculture and make a connection between them and environmental issues.
- 5th grade social studies lesson *Pollution*: Asks the students to devise an action plan to reduce the harmful effects of pollution they see in their environment.

Multiple points of view lessons (5 out of 72 lessons) encourage students to consider other opinions related to an issue.

Examples of this practice include:

- 4th grade English lesson *Developing and acting out a story*: Asks the students to act out a drama based on land use issues and then discuss the ability of community dramas to impact the discussion around environmental issues.
- 5th grade English lesson *Dramatization*: Students act out a drama where a “son of the land” returns to a village and informs the village that a mining company is interested in a mineral under the village. The villagers discuss what to do.
- 6th grade social studies *Compare the environment and climatic conditions of Liberia with her neighbors*: At the end of the lesson, it suggests preparing a class debate on land use that impacts deforestation within the community.

Overall, the curriculum has remained aligned with the themes established by the CDWG as well as the NC throughout its development. Although a review of the curriculum objectives and the references to illustrative materials would enhance the support it provides to teachers, the curriculum as a whole has successfully addressed the challenges identified during the both the rapid assessment and the pilot testing workshops. The curriculum has clearly integrated a number of best instructional practices into its framework and considering the constraints imposed on developing a curriculum in the Liberian context, it has managed to include all types of best practices to a lesser or greater extent.

TEACHER INTERVIEWS

In order to gather feedback on the effectiveness of the curriculum, teachers were interviewed at the various PROSPER sites selected for the distribution of the curriculum. Eight teachers in the Buchanan area, seven in Tappita and thirteen teachers around Sanniquellie participated in the interviews. The questionnaire for the interview (see Annex: Site Teacher Questionnaire) was developed based on Gardella's Environmental Education Curriculum Inventory with the incorporation of questions measuring environmental sensitivity and elements of the social sciences. Although the same questionnaire was used with each participant, there were a number of issues which impacted the validity of the responses. First, the curriculum is a significant improvement on the current level of support the teachers receive from the NC which offers no support or guidance with day-to-day instruction. This made it difficult for many teachers to offer an objective critique of the materials since they were so appreciative of the support provided by the lessons. Second, the 45 minute class period does not allow teachers enough time for many of the more in-depth inquiry based activities suggested by the curriculum. Also, teachers had taught a varied number of lessons during the school year. Some of those interviewed had taught only one or two lessons while others had taught almost all the lessons in their content area which skews the knowledge they have of the lesson plans and impacts the value of their responses. Finally, at a number of the schools, there were other issues such as infrastructure or frustration over not receiving a per diem at the November teacher training that distracted participants from responding to the questions with complete focus.

A number of common themes concerning the curriculum materials came to light during the interviews based on questions 2 through 9 in the questionnaire. Overall, the teachers were extremely satisfied with the lessons, particularly the support offered by the visual materials. Many of the teachers requested additional lessons with accompanying materials based on the NC. They agreed that all the lessons were age appropriate and five teachers mentioned that they gained new learning from the lessons in terms of content and teaching methodology. All but a few teachers felt the lessons were clear and used the assessment section of the lesson plans for in class discussions or homework.

Although, the teachers were extremely positive about the curriculum, roughly 75% of the respondents explained that some of the objectives were either difficult to measure or were too lengthy for a 45 minutes lesson. They recommended a review of the objectives with a view towards reducing the demands of some of the lesson. Also, four teachers mentioned that in Monrovia students may be able to complete the lessons within the 45 minutes but in rural areas English is a second language so students spend more time acquiring key vocabulary terms. Also, approximately 40% of respondents expressed the need for a text book to accompany the materials so they could read more about the subject matter before presenting it to their students. Finally, more than half of the teachers requested more training in how to integrate the lessons into their lesson planning with the NC. The respondents found it difficult to know when exactly the lesson should be taught during the marking period.

Every teacher was able to share environmental issues that they had discussed during their classes. However, these issues varied from region to region (see Table 1).

Table 1: Environmental Issues Discussed by Region

Region	Environmental Issues Discussed during Class
Buchanan	<ul style="list-style-type: none">• Wind damage to houses due deforestation• Littering• Open defecation• Hand washing

	<ul style="list-style-type: none"> • Covering latrine holes • Water sanitation • Community forestry • Loss of habitat for endangered species • Overfishing
Tappita	<ul style="list-style-type: none"> • Wind damage to houses due to deforestation • Reduction in clean drinking water due to deforestation • Hunting endangered animals • Importance of trees providing shade, food and oxygen • Community forestry • Handwashing • Keeping a clean environment to reduce the number of mosquitoes • How eating bush meat can spread disease
Sanniquellie	<ul style="list-style-type: none"> • Wind damage to houses due to deforestation (The annex building of one school was destroyed by a windstorm) • Hunting endangered species • How the forest protects and provides water, medicine, food, shade and habitat for animals • Water pollution from mining • Shifting agriculture • Overfishing with mosquito nets • Charcoal production and its impact on the forest

According to teachers these classroom discussions occurred regularly while implementing the environmental curriculum lessons.

Although teachers have only implemented the curriculum from the 4th marking period on since the materials were not distributed until November 2015, they have noted some impact on student behavior. During the interviews teachers shared anecdotal evidence of behavior change in the student population:

- More students have begun using trashcans at the school.
- Students told a teacher that the class needed to contact the FDA and ask for greater protection of the forests to prevent wind damage to homes.
- After seeing the poster of a girl with rickets and student told the teacher that she had always thought her neighbor had been “witched” and was surprised to understand that the deformity was due to a vitamin deficiency.
- In two instances, teachers reported parents asking about lessons that had been taught in the class which indicates students are sharing the information in the community.
- Teachers have witnessed students encouraging parents to leave more trees when they clear land for agriculture.
- A student reported a case of illegal hunting to an Environmental Education Club (EEC) sponsor.

These reports do not constitute an empirical proof of the curriculum’s impact on behavior but they do indicate that the curriculum is having some effect particularly when considering its short implementation period is considered.

During the interviews, teachers reported having some time to take their classes outside, although they explained that this was difficult due to time constraints. Teachers explained that they took students out of

the class to identify plants, collect both living and non-living things to bring back to the classroom, identify soil types, and search for examples of geometric shapes in the community. They expressed a desire to have a closer relationship with the EEC at their school in order to complete more in-depth investigations into environmental issues. Currently, the majority of the EECs are focused on starting cassava gardens, although one school reported the desire to begin a tree planting project and another school was preparing drama about charcoal production and its impact on the forest. All the EECs reported a need for gardening tools and more support in beginning their projects. Closer collaboration between classroom teachers and the EECs is something to consider as the curriculum moves into its second year of implementation.

When asked about possible upgrades to the curriculum materials, teachers provided a number of possible enhancements:

- **Student Workbook:** Many teachers expressed the desire for a student workbook which would provide more time by eliminating the need for notetaking. Also, this could become a valuable assessment tool to measure the impact of the curriculum.
- **Environmental Learning Points:** One teacher asked that the environmental Learning Points be highlighted in some way to differentiate them from the content Learning Points since he found it difficult to identify the environmental message in some of the lessons.
- **Environmental Competitions:** Another teacher suggested having an environmental awareness competition between schools to identify which students have gained the most environmental knowledge during the course of the school year.
- **Medicinal Plants:** A number of teachers in the Sanniquellie area asked if lessons concerning the use of plants for traditional medicines could be added to the curriculum.
- **English as a Second Language:** Schools in the Nimba region, asked if support for students learning English as a second language could be incorporated into the lesson plan structure.
- **Expansion of Lesson Plans:** Teachers from schools in all three pilot sites asked for more lessons to be incorporated into the new lesson plan format with an emphasis on lessons for the 6th marking period and for K level students.

Although teachers provided a number of suggested modifications or additions to the curriculum materials, they continually emphasized their appreciation and satisfaction with the materials in their current format.

Finally, during the course of the site visits, a number of concerns focused on competing curriculums came to light. One school in Buchanan reported that it was trying to implement curricula from Project Concern as well as the environmental education curriculum. Another school in Tappita said that they didn't implement the English lessons from the environmental education lessons since they used the AGRA program in all their English and reading classes. Finally, a teacher in the Sanniquellie area said that he had been trained in both the PROSPER environmental curriculum as well as the Conservation International environmental education curriculum which targets the same grade levels. This overlap in primary school curriculums may limit the ability of some schools to fully implement the lessons. A process, led by the MoE, to harmonize curriculum development for K-12 schools may lead to a reduction in this type of overlap in curriculum implementation and a harmonization between the efforts of different implementing partners.

SUMMARY

Overall, the final version of the curriculum is successful in meeting the goals established by the CDWG, addressing the needs of Liberian teachers and students, and incorporating internationally recognized best practices in environmental education into the Liberia's primary school curriculum. During its development, the curriculum was limited in its scope by the CDWGs desire to align it with the NC, the general capacity of Liberian teachers to incorporate more sophisticated best practices, and the resources available to schools in the rural setting. Taking these factors into consideration, the curriculum has taken the content and best practices associated with environmental education and made it accessible to Liberian students as evidenced by the overwhelmingly positive response by teachers who have implemented the curriculum over the past year.

The curriculum analysis revealed that the vast majority of lessons align with the themes established by the CDWG and all the lessons can be directly linked to objectives within the NC. The curriculum clearly addresses the need for illustrative materials and incorporates to a varied extent recognized best practices in the field of environmental education. However, a review of the lesson plan objectives, the depth of support each lesson provides for teachers, and the connection to illustrative materials would help to improve the quality of some lessons. A review of these lesson plan components with the feedback from implementing teachers would enhance the effectiveness of the lessons in making the Liberian student more knowledgeable about their environment and empowering them to identify and implement environmental solutions in their communities.

The teacher interviews provided significant feedback on the effectiveness of the lesson plans and indicated broad support for the curriculum materials. Overall teachers found the lesson plans extremely effective and witnessed some behavior change in regards to the environmental awareness of their students. Teacher feedback reaffirmed the need, identified in the curriculum analysis, to review lesson plan objectives and the depth of background information and instruction provided for teachers by some of lessons. Also, teachers provided valuable suggestions on how to improve the curriculum materials and enhance lessons geared towards increasing environmental awareness. A process led by the MoE to implement the enhancements identified in this report and harmonize curriculum development initiatives by implementing partners would continue to build on the positive impact achieved to date by the environmental education curriculum.

ANNEX- CURRICULUM REVIEW ARTIFACTS

CURRICULUM EVALUATION GRID

Lesson (G1-1 = Grade 1, Lesson#1)	Grade Level Themes			Lesson Plan Structure and Materials				EE Instructional Best Practices										
	Communicating with Nature (grades 1-2)	Environmental Awareness (grades 5-6)	Environmental Threats and Opportunities (grades 5-6)	Aligns with MoE Curriculum	Measurable objectives	Provides a structured guide for teachers	Illustrative Materials	Active Participation	Hands-on observation and discovery	Place-based learning	Project-based learning	Cooperative/group learning	Outdoor Instruction	Data collection	Relevance	Reflection	Issue-based learning	Multiple points of view
G1-1	x			x	x	x	x	x		x					x	x		
G1-2	x			x	x	x	x	x	x	x			x		x	x		x
G1-3	x			x	x			x										
G1-4	x			x	x	x	x	x		x				x	x			
G1-5	x			x	x	x		x	x	x				x				
G1-6	x			x	x		x	x	x					x				
G1-7	x			x	x													
G1-8	x			x	x	x	x	x		x			x		x	x		
G1-9	x			x	x	x	x	x	x	x	x			x	x	x	x	
G1-10	?			x	x	x	x	x							x	x		
G1-11	x			x	x	x	x	x							x	x		
G1-12	x			x	x	x	x	x		x	x				x	x	x	
G2-1	x			x	x	x	x	x		x					x	x		
G2-2	x			x	x	x	x	x		x					x	x		
G2-3	x			x	x	x		x		x					x	x		
G2-4	x			x	x	x	x	x		x					x	x		
G2-5	x			x	x	x		x		x			x	x	x	x		

G2-6	x			x	x	x	x	x	x	x		x	x	x	x	x		
G2-7	x			x	x	x	x	x		x			x	x	x	x		
G2-8	x			x	x	x		x	x	x								
G2-9	x			x	x	x	x	x		x					x	x		
G2-10	x			x	x	x	x	x	x	x					x	x		
G2-11	x			x	x	x	x	x		x			x		x	x	x	
G2-12	x			x	x	x	x	x		x					x	x		
G3-1		x		x			x	x		x		x			x	x	x	
G3-2		x		x	x	x	x	x		x					x	x		
G3-3		x		x	x	x	x	x		x					x	x		x
G3-4		x		x			x	x							x	x		
G3-5		x		x		x		x							x	x		
G3-6		x		x	x	x	x	x		x		x			x	x		
G3-7		x		x		x	x	x	x	x			?		x	x		
G3-8		x		x		x	x	x		x					x	x		
G3-9		x		x	x	x	x	x		x					x	x		
G3-10		x		x		x	x	x		x					x	x	x	
G3-11		x		x	x	x		x		x					x	x	x	
G3-12		x		x	x	x	x	x	x	x	x	x	x	x	x	x		
G4-6_Eng1			x	x				x	x	x		x			x	x	x	x
G4-6_Eng2			x	x		x	x	x	x	x		x			x	x		
G4-6_Eng3			x	x		x	x	x		x					x	x	x	
G4-6_Eng4			x	x	x	x	x	x		x					x	x		
G4-6_Eng5			x	x		x	x	x	x	x		x			x	x	x	x
G4-6_Eng6				x		x		x										

G4-6_Eng7			x	x		x	x	x		x					x	x	x	
G4-6_Eng8			x	x	x	x	x	x		x					x	x		
G4-6_Eng9			x	x	x	x	x	x		x					x	x	x	
G4-6_Sci1			x	x	x	x	x	x	x	x					x	x	x	
G4-6_Sci2			x	x		x	x	x		x					x	x		
G4-6_Sci3			x	x		x	x	x		x					x	x		
G4-6_Sci4			x	x	x	x	x	x		x					x	x		
G4-6_Sci5			x	x		x	x	x	x	x	x	x	x	x	x	x		
G4-6_Sci6			x	x	x	x	x	x							x	x		
G4-6_Sci7			x	x	x	x	x	x		x					x	x		
G4-6_Sci8			x	x	x	x	x	x		x					x	x	x	
G4-6_Sci9			x	x		x	x	x	x	x			x		x	x	x	
G4-6_SS1			x	x	x	x	x	x		x					x	x		
G4-6_SS2			x	x	x	x	x	x		x					x	x	x	
G4-6_SS3			x	x		x	x	x		x					x	x		
G4-6_SS4			x	x		x	x	x		x					?	x		
G4-6_SS5			x	x	x	x	x	x		x	x	x			x	x	x	
G4-6_SS6			x	x	x	x	x	x		x		x			x	x	x	
G4-6_SS7			x	x	x	x	x	x		x					?	x		
G4-6_SS8			x	x	x	x		x	x	x	x				x	x	x	x
G4-6_SS9			x	x		x		x		x						x		

G4-6_Mth1			x	x	x	x	x	x		x		x			x	x		
G4-6_Mth2			x	x	x	x		x		x					x	x		
G4-6_Mth3			x	x	x	x	x	x		x					x	x		
G4-6_Mth4				x	x	x	x	x		x					x	x		
G4-6_Mth5			x	x	x	x	x	x		x					x	x		
G4-6_Mth6			x	x	x	x		x		x			x		x	x		
G4-6_Mth7				x	x	x	x	x		x					x	x		
G4-6_Mth8				x	x	x	x	x		x					x	x		
G4-6_Mth9				x	x	x	x	x		x			x		x	x		

SITE INTERVIEW QUESTIONNAIRE

1. Which lessons did you teach during the second term that relates to the environmental curriculum booklet?

Directions: Please indicate the extent to which the lesson plans meet the criteria in questions 2-9.

0 = Not at all 1 = little extent 2 = moderate extent 3 = large extent 4 = completely

2. Did the lesson plans give you enough instruction on how to teach the content?
3. Are the lessons age appropriate?
4. Do the lessons provide opportunities for problem solving issues that face your community?
5. Do the materials engage the students' interest? If so, what is most engaging?
6. Do the lessons contain measurable objectives?
7. Is the information in the lessons accurate?
8. Do the lessons give you helpful assessment suggestions?
9. Do the lessons provide you with enough background information?

Directions: Please give examples if questions 10 – 19 are answered in the affirmative.

10. Does the curriculum discuss how technology, culture, politics, the law, or economics impact the environment?
11. Does the curriculum discuss population growth, ecosystems, energy cycles or the balance between humans and nature?
12. Does the curriculum teach students how to identify the role of human activity and its influences on the environment?
13. Does the curriculum discuss specific environmental issues that affect the community?
14. Does the curriculum ask the students to identify different solutions to the problem and consider the roles played by different people in the community?
15. Does the curriculum give you the opportunity to investigate an environmental issue facing the community?
16. Does the curriculum give you the opportunity to create an environmental action plan related to an issue in the community?
17. Does the curriculum have the potential to change the behavior or beliefs of the students this year?
18. How would you improve the curriculum?
19. Is there an active EE Club at your school? Can you give an example of what it has accomplished this year?

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