

The Local Scientific Lesson for Conservation and Utilizing Biological Diversity in the Pattani Watershed บทเรียนวิทยาศาสตร์ท้องถิ่น เพื่อการอนุรักษ์และใช้ประโยชน์ความหลากหลายทางชีวภาพ ในพื้นที่ลุ่มน้ำปัตตานี

Vichit Rangpan^{1*}, Nittaya Rangpan², Dusadee Matchimapiro², Naowarat Treepailboon²,
Narunol Thongmak³ and Duangporn Nujan⁴

¹Faculty of Science, Technology & Agriculture, Yala Rajabhat University, Thailand

²Faculty of Education, Yala Rajabhat University, Thailand

³Faculty of Science, Technology & Agriculture, Yala Rajabhat University, Thailand

⁴Researchers, Pattani Watershed Research Project, Yala Rajabhat University, Thailand

*Corresponding author, E-mail: vichit.r@yru.ac.th, Tel. 086-9577808

บทคัดย่อ

วัตถุประสงค์ของการศึกษาวิจัยเชิงปฏิบัติการแบบมีส่วนร่วมเพื่อพัฒนาบทเรียนวิทยาศาสตร์ท้องถิ่นการอนุรักษ์และใช้ประโยชน์ความหลากหลายทางชีวภาพลุ่มน้ำปัตตานี จุดเน้นของการวิจัย 1) ความร่วมมือระหว่างโรงเรียน มหาวิทยาลัยและชุมชนในท้องถิ่น 2) หาประสิทธิภาพของบทเรียน ตามเกณฑ์มาตรฐาน $E_1/E_2 = 80/80$ ผู้มีส่วนร่วมในการวิจัย ได้แก่ นักเรียน นักศึกษา ครู อาจารย์ ผู้บริหาร มหาวิทยาลัยราชภัฏยะลา วิทยาลัยเทคนิคยะลา โรงเรียนสตรียะลา โรงเรียนบ้านตานกาเต็ง นักเรียน ครู ผู้บริหาร จากที่สถาบันดังกล่าวและสมาชิกในชุมชนท้องถิ่น ร่วมมือดำเนินการวิจัยเชิงปฏิบัติการ แบบมีส่วนร่วม (PAR) ถูกนำมาใช้ในการศึกษา สัมภาษณ์การสนทนากลุ่มและการทดสอบถูกนำมาใช้ในการรวบรวมข้อมูล

ผลการวิจัยพบว่า 1) กระบวนการของบทเรียนวิทยาศาสตร์ท้องถิ่นเพื่อการอนุรักษ์และใช้ประโยชน์ความหลากหลายทางชีวภาพลุ่มน้ำปัตตานีสร้างขึ้น โดยความร่วมมือกับชุมชนนักเรียน นักศึกษา ครู อาจารย์ และผู้บริหารในโรงเรียน มหาวิทยาลัยในท้องถิ่น 2) การใช้บทเรียนวิทยาศาสตร์ท้องถิ่นเพื่อการอนุรักษ์และใช้ประโยชน์ความหลากหลายทางชีวภาพลุ่มน้ำปัตตานีสำหรับการศึกษาระดับปริญญาตรี ได้ค่าประสิทธิภาพ 89.07/88.00 ตามเกณฑ์มาตรฐาน $E_1/E_2=80/80$ และประสิทธิภาพของกระบวนการและผลของระดับการศึกษาขั้นพื้นฐานมีค่าประสิทธิภาพ 87.20/87.40 ตามเกณฑ์มาตรฐาน $E_1/E_2=80/80$ เพื่ออธิบายว่าประสิทธิภาพของกระบวนการและผลที่ได้มีค่าสูงกว่ามาตรฐานเกณฑ์ โดยมีค่าใกล้เคียงกันและต่างกันไม่เกิน 5 แสดงว่าบทเรียนมีคุณภาพ และมีผลสำรวจความคิดเห็นเกี่ยวกับบทเรียนวิทยาศาสตร์ท้องถิ่นระดับดี

คำสำคัญ: บทเรียนวิทยาศาสตร์ท้องถิ่น การอนุรักษ์ การใช้ประโยชน์ความหลากหลายทางชีวภาพ ลุ่มน้ำปัตตานี

Abstract

The objectives of this participatory action research study was to develop the Local Scientific Lessons for Conservation and Utilizing Biological Diversity Pattani Watershed. The focus of the study were 1)

the cooperation between school-university and local community. 2) find the effectiveness of the Lessons which the standard criteria of $E_1/E_2 = 80/80$. The participants were the researchers, Yala Rajabathat University, Technique Yala College, Satree Yala School, Ban Tangadang school, students, teachers, administrators, local community members. Participatory action research were used in this study. Interview, focus group and testing, were used for collecting data.

The research results revealed that: 1) the process of The Local Scientific Lessons for Conservation and Utilizing Biological Diversity Pattani Watershed construct through school-university-local community collaboration. 2) The used of the Local Scientific Lessons for Conservation and Utilizing Biological Diversity Pattani Watershed for the under graduate education had the efficiency value of 89.07/88.00 which the standard criterion $E_1/E_2=80/80$, the effectiveness of process and result were higher than the standard criterion, and the basic education had the efficiency value of 87.20/87.40 which the standard criterion $E_1/E_2=80/80$, the effectiveness of process and result were higher than the standard criterion and the value different of E_1, E_2 not more than 5 that this Local Scientific Lessons had the Quality, and the opinion of students was at the good level.

Keywords: *Local Scientific Lesson, Conservation, Utilizing Biological Diversity, Pattani Watershed*

Introduction

Pattani Watershed is considered as one of important areas for educational conservational and biodiversity exploitation studies. As an important watershed in the deep south of Thailand, it occupies area of high terrain accompanied by forest, plain and flooded land. It accommodates the flooding water and is lined by north to south orientation towards the east and some parts of its south side meets the watershed of the Sankala Khiri mountain ridge, in districts of Betong and Thanto, Yala Province. Pattani Watershed has the upstream originated from Sankala Khiri mountain ridge in Betong district, Yala Province. This River flows to the north passing through Thanto, Bannangsta and the Capital districts of Yala Province and towards Nongchik and Yaring districts, Pattani Dam, and lasts into the Gulf of Thailand in Pattani Capital, Pattani Province. Saiburi River originates from various peaks in Sankala Khiri mountain ridge, and flows through Chanek, SriSakhorn and Resoh districts of Narathiwat Province. It further flows to Raman district of Yala and into the Gulf of Thailand in Pattani Bay located in Saiburi and Yaring districts of Pattani Province.

With total of its distance for approximately 200 kilometers, it covers an area of Yala, Pattani and Narathiwat provinces, and serves population with density of 185 people per square kilometer. It also influenced by rainfall in average of 1,630 mm per year. As a watershed on the SanKala Kiri mountain ridge, the its upper boundary border is of Malaysia. Its lower area is a flat area where agriculture and animal husbandry is prevalent. With a population of about 443,810 people (Development of Environmental Quality, 2004), Pattani Watershed becomes important ecosystems in the region composing groups of sub-ecosystem like Bala Hala group, which is of rainforest, swamp, mangrove types. These freshwater and brackish water

ecosystems of Pattani River are therefore considered to be a source of biodiversity, enriched by varieties of wild plants and animals. Relatively, predominant wood species are Santol, Phru, Boonoot, Raja palm, climbing ferns, various rubber and rattan genera. Featured animals include Dayak bats, Singapore rats, flying - cheeked Squirrels, black hand gibbons, wild bears, wild tigers, panthers and so on so forth. Among bird species are hornbill, Rufous-tailed Shama, and Malay large-tailed nightjar and so on (Department of Forestry, 1999). In addition to wildlife, composition of Pattani Watershed also includes microorganisms and non-living things such as rocks, soil, and air as well as man-made buildings and infrastructure like dams, water reservoirs, ancient artifacts, and the activities of all forms of land use as well. These creatures are interacted each other to emerge important 4 functions of the ecosystem, which are the energy flow, circulating water, recycling nutrients and gas exchange.

Educating the biodiversity conservation and utilization as related to Pattani Watershed by creating the series of lessons in science teaching is therefore regarded as a helping way in making learning more efficient and gaining knowledge on the same direction. In fact, to make successful teaching and learning, the instructors must have knowledge about various things that relate to teaching and learning management systems including psychological and other factors such as teaching media and innovation as well as sets of educational instruction series. These self-created series would allow teachers to add-in their own objectives, contents and materials as well as events, which are neatly collected and compiled in relative to their contents. In this participatory research that everyone had the activity such as, the teacher and students of every institute to be the servay researcher in the area with Leader of community for Collecting the biological resources data. And improving the data by director of institute and the maind researcher of this research.

Thus, with the learning activities from creation of lesson series in the way of using teaching multimedia and self-completed with relevant to biodiversity conservation and utilization of Pattani Watershed should become a good helping way for local teachers in managing the local school science curriculum. This also enables students to achieve their learning objectives concerning to Pattani River conservation.

Research Objective

1. Study the cooperation between school-University and local community.
2. Examine the effectiveness of the Lessons with the standard criteria set up at $E_1/E_2=80/80$.

Research methodology

Preparation of natural classroom, method of Participatory and Period of Research.

1. Study to determine which area has more biodiversity, and such area was selected for a natural classroom and being better one.
2. Study the status of the community to be selected for running of a natural classroom. Security, ease of transportation, of understanding build-up, in particular the presence of Thai-local language

translator, and the presence of better performing local scholars, were categories to considered.

3. Participatory action research were used in this study : interview, focus group and testing.
4. The duration time of this research were used 1 year.

Creating local curriculum

1) Training seminar was conducted to emphasize the importance of creating a local curriculum by training teachers in Pattani Watershed. As many as 8 teachers form the leader of the program; 2 from each school were directed to synthesize the curriculum with participation of the local public network. 2) Creating a local course by discussion with local learning personnel and population as well as field personnel from the Basic Education. As a result, the draft of a natural classroom derived from the studied area was completed.

Local Scientific Lessons

Research and development of the Local Science instruction entitled the creation of Local Science Instruction on biodiversity conservation and utilization in the Pattani Watershed was based on research plan comprising of qualitative and quantitative research with a survey, observational and experimental Method. The research plan used Participatory Action Research (PAR). Sample groups from discussion set up on the study related to community context of Pattani Watershed was groups from the public, community leaders, local scholars, teachers, students, and environmentalists. Randomized sampling of the population in a particular area of Pattani Watershed constituted 40 teachers form the main teaching of every program in the intitute. Samples of 300 students were simple random sampling from secondary school Sastree Yala grade 10 (50), vocational school (50), primary school (50) and Yala Rajabhat University (150). They were taught local science lessons.

Specific Definition

Local Scientific Lessons defined as the book that had the details of knowledge of biodiversity conservation and utilization in the Pattani Watershed that comprised 2 learning sets, and they were (1) the learning sets for basic education, and (2) learning sets for higher education.

Conservation defined as using the resources and environment for immediate meads and saving for future use.

Utilizing Biological Diversity definid as the utilization the natural resources that living thing especially Biological Resources and considered the main of Biological Diversity

Pattani Watershed Instrument the area that cover the catment areas form Sonkharakhiri mountain consist of 18 villages defined as of Yala Province and Pattani Province.

Research Instruments and Step of Creating a research Instruments

Research Instruments included the followings.

1. Framework of questions that were used in focus group discussion and group conference. Questions concerned with general conditions and issues of Pattani Watershed. Curricular contents were lessons on biodiversity conservation and utilization in the Pattani Watershed.

2. Local science Lessons on biodiversity conservation and utilization in the Pattani Watershed comprised of 2 learning sets, and they were (1) the learning sets for level 4 of primary education, and (2) 2 learning sets; each for higher education and general individuals. In each of the learning sets, it was of 5 units covering the learning outcomes on cognitive domain. (3) Understanding pre-test and post-test modules of the biodiversity conservation and utilization of Pattani Watershed. Such modules for level 4 basic education and higher education were of the same levels and (4) learning activities for level 4 basic education were 5 activities. They were derived from the learning units and lesson plans for level 4 of basic education.

3. Researchers and assistant researchers as well as the publics, teachers, lecturers, community leaders, local scholars, environmentalists, and students, 300 in total observed general conditions and problems of the Pattani Watershed as well as those concerned with education, and biodiversity conservation and utilization. The scientific method and brainstorming session was used throughout this step. Brainstorming topics encompassing the general condition and biological resources in the Pattani Watershed, and its utilization was held to determine the content of natural resource knowledge. Students were required to learn on what and how to conserve and utilize Pattani Watershed biological resources. All results were recorded.

4. Focus group discussion participated by teachers, lecturers, community leaders, local scholars, environmentalists, students, 300 in total was staged to consider using the content of the Pattani Watershed biodiversity conservation and utilization as local science lessons based on community context. Results were recorded.

5. Group conferences with participation of instructor experts from local communities, science experts, media experts and environmentalist employed brainstorming on creating local science lessons and design of learning materials and media.

6. Workshop on 2 series of learning materials was set; each for students of level 4 primary education and year 1 of higher education. Each learning series with 5 learning plan consisted of learning content and exercises concerning media of local nature, local and folk wisdom as well as biological resource experiments and analysis. In this regard, community participation in providing students the real knowledge, and helping to instill students the attitudes were included. Learning process employing the learning activities of science process skills and group process skills became the means of learning involving the techniques and innovative use of learning activities that focus on student-centered.

7. Face validity of the learning series was determined by using evaluation reports from the experts in subject content and learning process. Learning plans, outcomes, contents, and processes as well as steps involving learning activities, media and tools, and result evaluation were assessed.

Data collection.

Local science lessons on biodiversity conservation and utilization in the Pattani Watershed were created using the following procedures.

1. Review the educational textbooks and research papers related to practical research participation in biodiversity conservation and utilization in the Pattani Watershed to learn the basics of urban context before conducting the fieldworks. To achieve the objectives of the research, the educational issues, forum and focus groups questions were determined.
2. Collect data, the coordination to concerned individuals and agencies was initiated.
3. Prepare research assistant and equipment and tools for data collection.
4. Improve the Local science learning series and on biodiversity conservation and utilization of Pattani Watershed for both level 4 primary education and Year 1 higher education according to the recommendation of the experts. This was completed prior to the actual trial to sample population.
5. Implement the local science learning series to determine the learning efficiency of 80/80 criterion, and also to conduct opinion survey concerning the lessons.

Data Analysis and Statistics

school (50) and Yala Rajabhat University (150). They were taught local science lessons.

For analysis of data collected from the textbooks and studied areas implemented with biodiversity conservation and utilization activities in the Pattani Watershed, results from workshops, focus group, meetings or group conference, experimental and operational works were analyzed and synthesized by percentage, and the descriptive summary as well as learning management reports for biodiversity conservation and utilization in the Pattani Watershed were hence come out. In plummeting the local science learning series was finally conducted to determine the learning efficiency of 80/80 criterion, and also to conduct opinion survey concerning the lessons by percentage.

Results and Discussion

Results of the participatory scientific research process in creating scientific knowledge on biodiversity conservation and utilization in the Pattani Watershed. The findings from the participatory scientific research process in creating local scientific knowledge on biodiversity conservation and utilization in the Pattani Watershed revealed that students from Yala Rajabhat University, Vocational school year 1, and Satee Yala Secondary School, in Yala performed field participation in each 6 sites from the upper, middle and lower parts of the area. Interviews and focus groups were held in discussing biodiversity conservation and utilization in the Pattani Watershed of 18 areas that were considered of major for leandmed planning (Junkeow, 2009). Students and people collected water samples to study the biological resources. They gave comment on bioresource utilization. As the conducting process involved studied in the laboratory of Yala Rajabhat University and participation of the concerned parties, the focus on education, biological resource conservation

and utilization was thus achieved in all 18 major communities. Consultation and comment, especially from those of the responsible agency likes the office of the natural resources and environment was included in the discussion as well. Sharing in learning on study of biological resource conservation and utilization employed guides from the scientific process as follows. 1. observe and interrogate the required issues. 2. Create hypothesis and test by using people, who lived in 18 areas of the Pattani Watershed. They were shared by students and teachers as well as the operation officer of the Office of Natural Resources and Environment, Yala Province. 3. Conduct experiments, analyse and operate on matters of biological resource conservation and utilization in the Pattani Watershed by using related communities as a learning and training experience resources. 4. Analyse the data. 5. Summarise them. Researchers, teachers, students and the local people, the Environment and Natural Resource Officers summarized operation results, which were of the local science lessons constituting the Lesson 1, common condition and problems of the Pattani Watershed; Lesson 2, local wisdom in biological resource use in the Pattani Watershed; Lesson 3, threats and their causes of biological resources; Lesson 4, Biodiversity conservation; Lesson 5, Restoration and conservation principles for the Pattani River biodiversity.

Constructing local scientific lesson on biological resource conservation and utilization in the Pattani Watershed. This was done after local wisdom and local biological resource study was completed. All processes were brought together to determine the content and thus construct the course that was fit with levels of students. Such course was of local science lessons that were related to biological resource conservation and utilization in the Pattani Watershed. Their 2 lesson, as examples, were those of local science lessons on biological resource conservation and utilization in the Pattani Watershed for the basic level and higher educational level as well as for the public in general. Performance of Local science lesson on biological resource conservation and utilization in the Pattani Watershed was determined by comparing score results obtained from the pre- and post-learning activities using the $E_1/E_2=80/80$ category. Of the research findings, the use of local science lessons on biological resource conservation and utilization in the Pattani Watershed and 5 lessons from primary education levels scored higher category of performance. Relation between process and outcome found average of 87.20/87.40, which the set standard of $E_1/E_2=80/80$. In this study had the effectiveness higher then the standard criterion and the value different of E_1 and E_2 more then 5 that these Local Suentific lessons had the Quality (Phomevong, 2013). Considering the efficiency of the teaching series as a separate unit, it was found that lessons taught by all classes were very powerful at the score of (1) 85.33/92.06, (2) 87.00/86.26, (3) 91.50/84.93, (4) 84.73/83.33, (5) 87.46/86.40.

1. Lesson No. 1; common condition and problems of the Pattani Watershed scored 85.30/93.06.
2. Lesson No. 2; local wisdom in the biological resource uses in the Pattani Watershed scored 87.00/88.26.
3. Lesson No. 3; Cause and threats of biological resource harassment scored 91.50/84.93.
4. Lesson No. 4; Biodiversity conservation was at 84.73/83.33.
5. Lesson No. 5; Principles for biological diversity restoration and conservation was at 87.46/88.40.

That is, each teaching unit had markedly high performance; both the process and the results. This corresponded with the study of Ratana Chayacharoen (1999), who constructed the instruction units that focused on processes of 9 aspects in the subject of Life Experience, Unit No. 5; livelihood, various professions in the community. This was for Level 4 primary school, and its efficiency was found to employ pre- and post-test results. Ability to solve problems was statistically higher level and significant at .01. In addition, the instruction unit constructed was powerful at 80/80 and consistent with work of Wiccha Khrupiti (1999), who conducted research on constructing a instruction unit in mathematics; clock for level 2 primary school. The study results showed that the built teaching unit was powerful at 85.00/85.14, which was higher than the standard. In addition, Attasara (1999) conducted research on construction of teaching units for the basic profession subject, plant propagation sub-subject used in the level 6 primary school, and it was found that the built unit had effective value of 81.74/83.87, which was in accordance with the standards specified.

As regard to local science lessons on biological resource conservation and utilization in the Pattani Watershed for high education level, effectively constructed teaching lessons were 5 chapters with effectiveness higher than the standard of process-outcome relationship, average score of 89.07/88.00, which the set standard at 80/80. In this study, it had the effectiveness higher than the standard criterion and the value different of E1 and E2 more then 5 that this Local Suentific lessons had the Quality (Promvong, 2013).

Considering the effectiveness of the learning series based on each chapter, it was found that all teaching lesson chapters were effective.

That is, Lesson No. 1, common condition and problems of the Pattani Watershed had effectiveness score of 92.00/92.00; Lesson No. 2, local wisdom in knowledge in biological resource use in the Pattani Watershed, score was 86.83/89.67; Lesson No. 3, threats and causes of biological resource harassment scored 94.50/86.00; Lesson No. 4, biological resource conservation had score of 84.67/86.66; and Lesson No. 5, principles for biodiversity restoration and preservation scored 87.33/86.1066.

Noted that research results on the use of local science lessons related to biological resource conservation and utilization in the Pattani Watershed had the findings that were consistent with many different research works for example Hatta (2006) studied the resources of Pattani Bay but can not studied the resources of the Pattani watershed because it had the bad situation in this areas. This was because students themselves had their learning from instructors in a systematic manner. Sequences of events were strictly followed in consistent with scheduled hours. Such processes had made students developing the academic achievement and other aspects. This led to the learners acquired science knowledge and process, and they gained skills from the child-centered learning activities. They correctly linked the learning resources in the local community to learning resources, like experiments, projects and real operation in local community. From the research findings, it was obvious that local science lessons on biological resource conservation and utilization in the Pattani Watershed were effectively be used in teaching activities in order to establish

the soil conservation and sustainable biological resource utilization in the Pattani Watershed.

Recombination From Research Finding

1. In this research, it found that the used of the local Scientific Lessons for Conservation and Utilizing Biological Diversity Pattani Watershed for the under graduals education had the efficiency value of 89.07/88.00 while the standard criterion was $E_1/E_2 = 80/80$, it can be explained that the effectiveness of process and result were higher than the standard criterion and that should be the extention this lessons for the ather University especially in the areas of three Southern Province.

2. The basic education had the efficiency value of 87.20/87.40 while the standard criterion was 80/80, it can be explained that the effectiveness of process and result were higher than the standard criterion, and should that extend to every school in this area especially the muslim private schools, should for the builds a wariness to the young generation people of Thailand.

Recommend for the Future

1. The local Scientific lessons for conservation and Utilizing Biological Diversity in the Pattani Watershed in the next research should be each speice or each group of Biological Diversity in this area.

2. In the long-term period will be doing the big project of research for the cover of the catchment areas or the south of Thailand Watershed.

Acknowledgement

Research work on constructing the local science lessons, entitled biological resource conservation and utilization in the Pattani Watershed was funded by the Higher Education Commission. Ministry of Education, Thailand. All research objectives have been fulfilled in all respects, thanked to cooperation from communities in the Pattani Watershed and appreciated the delivery of knowledge and practical experience to the public and students by the Office of Natural Resources and Environment, Yala Province.

References

- Attasara, S. (1999). *Creating instructional series, subject; profession and the basis of profession, entitled plant propagation for level 6 primary school*. Bangkok: Srinakharindhwit University, Prasarnmit.
- Chayacharoen, Rattana. (1999). *Constructing the tutorial series of promoting Life Experiences, Unit of the 9-process-emphasized livelihood, level 4 primary school*. Bangkok: SriNakharindhuroj University, Prasarnmit.
- Development of Environmental Quality. (2004). *Fundamental Data of Pattani Watershed*. Bangkok: Author.
- Development of Forestry. (1999). *Report of Natural Resources and Wildlife Area II conservation Project Pattani Thailand*. N.P.: Author.
- Hatta, Klongchai. (2006). *The Conservation of Resources of the Pattani Bay Pattani Province*. Songkla: Songkla University.
- Jaenji, Pannee Ch. (1995). *Teaching Psychology (4th edition)*. Bangkok: Ton-ow Grammy
- Jankeow, K. (2001). *Environmental Science (5th edition)*. Bangkok: Kasetsart University Press.
- (2009). *Environmental Management*. Bangkok: Kasetsart University Press.
- Khрупiti, Wicha. (1999). *Creating Instructional series, Math skills on Clock for level 2 primary school*. Chonburi: Burapha University.
- Phomevong, C. (2013). The Efficiency Value of Media. *Journal of Education Research Silpagon University*, 1.