Part 1: Details of your school

1.Name of school : Lampang Wittaya School
2.Full address : 14 Surane Road, Sobtui,
Amphoe Muang,
Lampang province
3.Postcode :52100
4.Country : Thailand
5.Telephone number :6654 217378
6.Fax number : 6654217378
7. Name of director : Tawit Paweenbampen, Mr.
8. Name of Teacher Coordinator : Orapin Kiatkulpakdee, Mrs.
9. Email address : tawitpaweenbampen@yahoo.com
10.School website :
11.Educational level : Kindergarten1 to grade 6
12. Number of teachers : 30
13. Number of students : 590
14. Name of teachers involved in planning and implementation of activity on Education for Disaster Risk Reduction.

a. Wasana Paweenbampen, Mrs.
b. Kesara Panyayao, Mrs.
c. Suthep Lankaporn ,Mr.
d. Suparp Phichombutra ,Mrs.

Part 2.Information about the school's activity on Education for Disaster Risk Reduction

1. Title of the school's activity on Education for Disaster Risk Reduction.

Study on landslide and flood in Lampang province, Northern Thailand.

2. Summary of activity

1. Students of grade 6 learn about history of landslide and flood in the northern Thailand and Lampang province.
2. Students learn about weather and rainfall in northern Thailand and Lampang province.
3. Students learn about topography and landform of northern Thailand and Lampang province.
4. Students learn about causes and effects from landslide and flood.
5. Students learn about monitoring and warning system
6. Students conduct experiments on river flow, flood and landslide.
7. Students have a field trip to flood-and-landslide prone areas.
8. Students have discussion and presentation of their study and submit report .
9. Students share knowledge with their parents and communities.

3. Background information or reasons why the school initiated this activity

During September 2011 to January 2012 there was an extensive and extreme flooding in central Thailand including northern part of Bangkok. It was the worst and most devastating flooding ever occurred over the past 75 years causing large-scale destruction and hundreds of death. Government has to allocate hundreds of billion baht to compensate the property losses of people and to renovate infrastructures

and facilities. Before the flooding, a number of landslide occurred in the north which was upstream of the flooding areas . Scientists have warned that climate change can cause intense rainstorm more frequently therefore flood and landslide are more likely to occur than ever.

Lampang is a province in northern Thailand of which two-thirds the areas are mountainous and , according to Department of mineral resources , 165 villages are landslide and flood prone. Despite the number of deaths and damages are increasing over the past decade, a lot of people are not well aware of the disaster. We, as educators, feel it is our responsibility to educate our students about landslide and flood and make them aware of the risks .We also expect that they can escape from dangers upon facing such hazards.

4.Objectives/goals of the activity

1. Students understand causes and effects of flood and landslide.
2. Students knows how to recognize and avoid the landslide prone areas.
3. Students knows how to escape and survive from flood and landslide.
4. Students can share their knowledge with their parents and neighbors.

5.Period of time when this activity has been implemented

June – August 2012

6. Activities (Short-term actions and strategies of implementation of short term actions)

1. Background and history of landslide and flood

By integrating subject matters of science, geography , social study, mathematics and English language a learning unit on landslide and flood is created for students of grade 6. Students learn about features and causes of landslide and flooding. They should know that a landslide is a type of " mass wasting " which is down slope movement of soil, rock, or debris under the influence of gravity. They learn about types and features of landslides (slide, slump, rock fall, mud flow, debris flow, etc.). In Thailand the most hazardous type of landslide is debris flow. It is the mixture of water, soil, rock fragments and plants of various sizes. It can cause extensive damages to communities nearby its path and up to 15 km. all the way along the riverbank.

About flood, students learn that flooding is when the water level in a creek, river, lake or the sea rises and cover the land. The rise in water level can be due to numerous causes, but the most common is heavy rainfall. Flooding that is sudden and unexpected is referred to as flash flooding. It is usually associated with landslide, especially with debris flow. It is mostly caused by slow-moving thunderstorms that deposit an extraordinary amount of water in a relatively short period of time.

Over the past decade the northern part of Thailand has experienced 12 severe landslides and flash floods that caused more than 150 people died in the incidents and thousands of houses, facilities, and properties were destroyed. In Lampang area 165 villages from 12 districts are declared landslide and flash flood prone areas by the government.

2. Study about rainfall

Since rainfall is one of the key factors that trigger landslide and flood phenomena. The students need to have some knowledge about the weather especially with the rainfall. By searching in Meteorological department website , students learn about climate in northern Thailand. They should know about

- Time period of each season in Thailand
- Types, directions, intensities and time period of storms from the south china sea (tropical depression, tropical cyclone and typhoon)
- Direction and time period of monsoon and monsoon trough.
- Some definitions of technical terms referred in weather forecast
- Students learn how to make simple rain gauge and try to do precipitation measurements by themselves.
- Students also learn that during august and september it is a crucial time to keep an eye on landslide and flood as it is the time period for tropical depression and heavy rainfall in the northern Thailand.

3. Study about topography and landform

Since topography and landform of particular area play a very important role in occurrence of landslide and flood.The students have to know something about key elements of the terrain (slope, relief, height, drainage pattern, land use etc.). To understand topography and landform of Lampang area they use three dimensional model, shaded relief map and topographic map as tools for study.

On shaded relief maps students learn how to classify different physical features of places by observing color shadings. They can identify areas of mountain ridges, mountain sides, valleys, creeks and rivers, flat lands, lakes etc.

On topographic maps, they learn how to read elevations from contour lines . The information they get from topographic map help them to understand more about the shape, height, slope steepness and landform of the areas

As an application of their lesson on map reading , students copy and trace drainage lines from topographic map onto transparent sheets in order to study sizes, shapes and flow patterns of rivers .Later they measure cumulative length of each river and it's tributaries. The students then discuss about risks of flood and landslide in several villages by comparing slope steepness of the area, density and length of drainage, direction of river flow , location and elevation of each community.

4. Study about disaster- prone areas and their warning system

Geologists from Department of mineral resources, as special lecturers , share their knowledge and professional experiences with the students by giving a special lecture on geo hazards. From the lecture students learn about

- Causes and types of landslide occurred in Lampang and surrounding areas.
- Places and villages in Lampang where are landslide prone
- Intensity and damages of landslide in each place.
- Rock and soil types in the areas of landslide
- Some important properties related to slope stability of each formation
- Some structures that can weaken the rocks (faulting, bedding, fracturing etc.)

Apart from geology of the risky areas the geologists also give information about monitoring and warning system. The students learn about

- Monitoring precipitation and run-off during heavy rainfall
- Determining safe areas for immigration
- Making announcement or signals for people to evacuate
- Reporting to the local government agencies
- Seeking rescuer.

5. Experiments on landslide and flooding

To help students understand the mechanisms of landslide and flooding we have them do experiments . Using inclined table and stream bed students conduct experiments.

5.1 Experiments on landslide

Since landslides mostly occur on terrains with relief and slope, the experiments are about earth materials and slope angles. Students put different earth materials (sandy, clayey and rocky material) in different containers (shoes boxes). The containers are placed on a table. The students then slowly raised up the table at one end to vary the slope angle then observe sliding occurred in each material and make record .The angle of slope are read from inclinometer simply made from student's protractor. The experiments are conducted to compare the angles of failure in different material .Then they are repeated with the same material but different conditions (dry, moist , soaked).From the experiments students can understand and visualize actual landslide in nature. The procedure for experiment is as follows.

5.1.1 Introduce the different types of landslides that occur. Discuss the different conditions that trigger each type and the resulting damage wrought by each type.

5.1.2 Tell students they will be designing their own lab to test different types of landslides. Review the materials they'll be using to simulate a small-scale landslide.

5.1.3. Ask the class to then brainstorm a list of the different variables that trigger landslides, such as slope, material, and amount of water.

5.1.4 Divide the class into small groups and have them describe how they will simulate different types of landslides. Remind students that they should test only one variable at a time—and carefully record the variable each time. They will need to repeat their experiment three times, then average the results of each to obtain more accurate data.

5.1.5. Students begin by filling their container halfway with material (sand, clay, rock). To vary the angle of the slope, have students raise one end of their stream table. Students should measure this angle using a protractor.

5.1.6. Next, have students slowly pour a measured amount of water on the higher end of the container until all the material is soaked. The water is added gently with a small rubber hose. Have students observe and illustrate the patterns formed in the material.

5.1.7. Once the material has been soaked with water—without the material moving—students can create a landslide . To do this, they need to slowly add a measured amount of water over a period of time. Students should be carefully measuring the total amount of water they add and observing the exact amount that has been added to instigate the landslide. Once the landslide has occurred, they should measure the amount of material involved in the slide by volume or weight.

5.1.8. Students repeat their experiment twice and average their results between the three trials.They then experiment with different water amounts, materials and slope angles.

5.1.9. Have each group share its results with the class and submit reports..

5.2 Experiments on flooding

Since flooding mostly occur on low-lying areas , namely floodplains, the experiments are about flowing of water on an inclined plane covered with sediments. The students use the same wooden table from previous experiment as equipment but this time ,in addition, cover it all over with sand up to 8-10 cm. thick. The table is raised on one end to be inclined about 20% (vertical : horizontal = 1:5).This table is now called stream table. Circulated water is pumped up by a small aquarium pump and hose from a basin below the table to its upper end and let water flow across the stream table back to the same basin. The students then observe the effects of the flow occurred on stream table. This experiment help students to understand that some places along flood plain might be safer than others. In the experiments they can determine which part of a meander is safer to live on in normal conditions and which side is safer in a flood. The activity is as follows

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5.2.1 Set up the stream table so that it slope upward about 20%. Create a meandering river by drawing an S in the sand about 5 cm. wide and 2 cm. deep. Use materials dredged out of the river to create levees along the sides of river.

5.2.2 Locate the top meander (the curve on the S closest to the water source). Place a toy house on the inside portion of the meander, right on the back of the levee, and place another house on the outside of the meander, the same distance from the river channel as the first house. Draw a map showing the layout of your stream.

5.2.3 Start the water flowing in the river at a low and constant rate (without gushing water). Start the stopwatch at the same time.

5.2.4 Note on the map areas of erosion (sediment being carried away from the riverbanks) and areas of deposition (sediment is put down again).

5.2.5 Time how long it takes for the houses to fall into the river. Note which house it was and how long it took. If no house falls in after 10 minutes, stop the experiment and note that nothing happened to the house.

5.2.6 Repeat steps 1-5, but this time increase the water velocity to represent a river at high water levels.

5.2.7 Repeat steps 1-5 again, but now create a flood by pouring water in rapidly. Again, note areas of erosions on the map, time the amount of time it takes for a house to fall in, and note which house falls in first.

5.2.8. Have each group share its results with the class and submit reports..

7. Resources used for implementing the activity

1. Topographic map, scale 1:50,000 series L 7017S sheet 4845 I Prepared by Royal Thai Survey Department
2. Topographic map, scale 1:50,000 series L 7017S sheet 4945 III Prepared by Royal Thai Survey Department
3. Topographic map, scale 1:50,000 series L 7017S sheet 4945 IV Prepared by Royal Thai Survey Department
4. Shaded relief map, northern Thailand, scale 1:500,000 Prepared by institute of academic development, Thailand
5. Geological map of changwat lampang, scale 1:250,000 Prepared by Department of Mineral Resources, Thailand
6. Landslide hazard map of lampang province, scale 1:250,000 Prepared by Department of Mineral Resources, Thailand
7. Three-dimensional model of flood and landslide
8. Inclined table for landslide and flooding simulation
9. www.dmr.go.th
10. www.tmd.go.th
11. www.usgs.org

8. Monitoring and evaluation mechanism and results

Monitoring: in each activity

1. Have students do brainstorming and do oral presentations
2. Have students write reports on their experiment

Evaluation: use three-point rubric (Three points if good , two points if fair , one point if poor)

Oral presentation criteria
-subject matter of presentation
-techniques used in presentation
-presenter's personality and speaking

Experiment criteria
-data organizing
-hypothesis
-procedure
-conclusion
-scientific merit

9. List of partners, local government bodies, companies or development agencies who participated in the planning and implementation, including their roles in the activity.

Name of Partners	Roles or contributions
a) Department of Mineral Resources Zone 1, Lampang	a) Special lecture on landslide hazard in Lampang area
b) Disaster Prevention and Mitigation Lampang Provincial Office	b) Demonstration of evacuation and rescuing flood and landslide victims

10. Benefits of activity to teachers, students and the community

Teachers:

They are able to create and develop learning units and lesson plans about landslide and flood by integrating several subject matters. This will be the starting point to create other plans on disasters.

Students:

Apart from knowledge and understanding on landslide and flood they have learned, they gain skills in searching for information from literatures and from internet. They also have skills in doing experiments in group.

Community:

People start to have better awareness of their own security and give more collaboration to prevent disaster.

11.Plan for sustainability and plan for the future

Plan for sustainability:

School plans to put the learning unit into curriculum for students grade 5-6. Students will learn it in Science, geography and scout activity classes. Director of Department of Mineral Resources Zone 1, Lampang has agreed to support school with lecturer and learning material every year.

Plan for the future:

Teachers and students have selected 3 risky villages as study areas. They plan to have field trips and study the areas in every aspect they have done in school.The three areas are in different district ,namely , Hangchat district, Mae Tha district and Muang Pan district. After the study a " Detailed Study on Landslide and Flood Prevention " report will be submitted

In October staff from Prevention and Mitigation Office will demonstrate and give training to our students on evacuation and rescuing of flood and landslide victims.

After students have complete all their studies school will organize a seminar on Disaster Risk Reduction. The students will share their knowledge and experience with their parents and neighbors.

12. List of attachments such as a copy of learning/teaching materials, samples of student worksheet, manual, etc.

Attachment 1) Geologic map of changwat Lampang
Attachment 2) Landslide hazard map of Lampang province
Attachment 3) Location map of landslide-and-flood prone villages in Lampang province
Attachment 4) Landslide warning network map of Ban Kho, Muang Pan district, Lampang province Lampang province

13. Photos related to activity

Photo1 Students are studying causes and effects of disaster from exposition board & poster supported by Department of Mineral Resources (DMR)

Photo2 Geologist from DMR is explaining and sharing experiences with students

Photo3 Director of DMR, Zone1 is giving a lecture on landslide and flood disaster

Photo 4, 5 Three-dimensional model for topography and landslide disaster study

Photo 6,7 Students are conducting experiment on landslide simulation.Using wooden window pane and shoes boxes as equipment.

Photo 8,9 Reading slope angle from clinometer made from simple protractor