RTC-TH Mar 2012 Update 2

© 2012, All rights reserved.

www.neighborhoodlink.com/org/rtcth E-mail: rtc2k5@gmail.com

Community-based environmental education for the self-sufficiency and sustainability of small rural family farms

ชุมชนตามสิ่งแวดล้อมศึกษาเพื่อการพึ่งตัวเองและยั่งยืนชนบทขนาดเล็กครอบครัวฟาร์ม

You may post questions / comments to the Discussion area of our website

Arbor Day: Remembering the Importance of Trees

Scorched deforested hills of northern Thailand

Flood waters from the north deluge central Thailand.

"A picture is worth a thousand words." So as a reminder of Arbor Day (coming up toward the end of April), the photos on the left shows what a world with few trees would look like and a possible consequence.

Deforestation, regardless of the reason (i.e. greedy businesses, corrupt government officials, farmers seeking more land, etc.), disrupts natural balances and watersheds. The recent floods in Thailand were not caused by deforestation alone. Multiple factors came into play, and converged to create a natural disaster of gigantic proportions. The impact of the flood was like a global economic tsunami.

In 1961, forests were estimated to cover about 61% of Thailand. From 1973 to 1998 forest area declined from 43.33% to 25.28%. Devastating floods in 1988 led to a ban of teak logging in 1989. Clearly they recognized the connection of deforestation and flooding.

Year	Forest Area (sq. km)	Percent	Deforestation Area (sq. km)	Periods (Years)	Annual Deforestation Rate (sq. km)
1973	221,725.00	43.33			
1976	198,417.00	38.67	23,308.00	3	7,769.33
1978	175,224.00	34.15	23,193.00	2	11,596.50
1982	156,600.00	30.52	18,624.00	4	4,656.00
1985	150,866.16	29.4	5,733.84	3	1,911.28
1988	143,803.49	28.03	7,062.67	3	2,354.22
1989	143,417.00	27.95	386.49	1	386.49
1991	136,698.05	26.64	6,718.95	2	3,359.47
1993	133,553.55	26.03	3,144.51	2	1,572.25
1995	131,485.06	25.62	2,068.49	2	1,034.24
1998	129,722.28	25.28	1,762.77	3	587.59

Source: Charuppat, 1998

Using the estimate that Thailand had a forest cover equal to 25% of its total, the current Thai government policy is to protect 15% of Thailand's land area as forest.

In This Issue

Arbor Day: Remembering the Importance of Trees	1-3	Ideas for Effective Lessons	8-9
Background on Thai Climate & Forests	4	Brown Plant Hopper Infestation: A Lesson	10
Smoke & Haze Smother the North	5-6	Our Western Firebreak Worked	11-12
Northern Thai Smoke: A Really Big Mess	7		

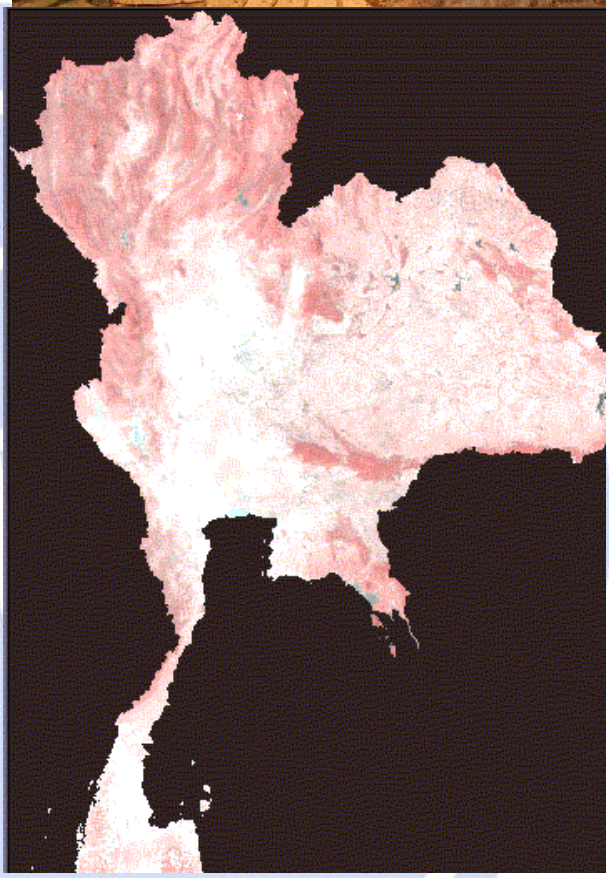
©2012, G.K. Lee. All rights reserved.

Another government report on satellite imaging conducted in 1996 and 1998 stated 29% (or ~ 513,000 km²) of the country's surface area was forested. However this included all types of forests, plantations and some reforestation activities.

A more detailed breakdown shows:

Forest Type	% of All Land
Tropical evergreen	10%
mixed deciduous	9%
dry dipterocarp	5%,
pararubber	4%
swamp, scrub, pine, bamboo and mangrove	1%.

27 December 1985



31 January 1993

This is an area cleared of forest for farming.

The images above were compiled from satellite data showing the change in forest cover (in red) for most of Thailand from 1985 to 1993. Change in and of itself is not necessarily negative or positive. But deforestation has wide spread implications for water resources, land management, and sustainable agriculture. In 2002 newer and more precise satellite measurements put forest cover estimates to ~36%. And by 2004, it shrank to ~34%. Suggestions to use digital image processing for more detailed change-over-time analysis also pointed out the added need for more trained technical personnel to do this work.

©2012, G..K. Lee. All rights reserved.

In a nutshell, it is widely agreed the causes of deforestation are:

- Population growth
- Land ownership policy
- Agriculture
- Industry
- Wildfire

The first 3 factors are closely interwoven. Landownership reform has largely ground to a halt since the bloodless coup of 2006. As the population increased more land was needed to grow food to support them. With limited open land to farm, forest encroachment increased for agriculture. Industrial crop production also sought more land for rubber, palm oil, and cassava. Limited enforcement personnel as well as corruption led to apparent lax enforcement on forest protection and encroachment regulations. The consequences of deforestation include:

- Flood
- Soil erosion
- Habitat destruction
- Wildlife Extinction
- Global Warming
- Climate Change
- Economic impacts

Soil erosion on a cassava plantation. (Notice the rows down the slope and not along the contour of the land.)

The magnitude of the recent floods occurred with forests covering ~34% of Thailand. Though the flooding was not entirely due to deforestation, this may be a good time to re-examine the 15% forest cover protection goal. Clearly more land protected for watershed management and reducing runoff and flood potential would be a step in the right direction for improved flood management.

We haven't researched the various efforts in reforestation by government and private groups. But on a trip through the mountains of Chiang Rai, we saw a reforested area. We were surprised to see what appeared to be a uniform area of Pines. They were all about the same height and spaced about 1.5 m apart. This seems to suggest a planting effort. This caused us to wonder about the lack of biodiversity in this apparent reforestation effort.

We are lucky to have a protected forest area upslope of our farm. This watershed provides the subsurface water flow down through the terraces to our fish ponds (especiially in the dry season). The forest also serves as a reservoir for local pollinators and insects (both beneficials and pests). Protecting the biodiversity helps maintain an ecological balance. A subsistence farm is naturally a bio-diverse environment

The protected forest guards our watershed.

©2012, G..K. Lee. All rights reserved.

Background on Thai Climate & Forests

Early attempts to study world climate were hampered by the lack of weather data around the world. Since plants need water to survive, vegetation and potential natural vegetation was often used as an indicator for climate. These general reference tables are the starting point for discussions. Field surveys and site specific studies are needed to develop management plans for a particular farm. Rainfall is not uniform over the Earth. G.R.O.W. (Getting Real On-farm Weather) is the key RTC-TH program training farmers to get relevant weather data for their farm. [Note: The shaded areas in the tables apply to the part of Thailand where we operate.]

Generalized Climatic Data for the 6 Physiographic Regions Of Thailand (Wettest to Driest)					
Physiographic Region	Annual rainfall (mm)	Annual mean humidity %	Annual mean temp (°C)	Absolute max temp (°C)	Absolute min temp (°C)
West Coast	2,177-5,106	77-83	27	35.5	19
Southeast Coast	1,312-4,456	74-78	27	38	9
Central Plain	1,220-1,592	64-76	27-29	39-44	5-12
Northeast Plateau	1,089-2,163	68-73	26-27	42-43	2-4
N & W Continental Highlands	1,045-1,744	71-75	24-28	40-43	2-6
East Coast	1,018-2,568	78-82	27-28	38-39	14-18
Central Highlands	1352	70-73	26-28	41-43	2-7
Source: Meteorological Department, Thailand					

Forest Types, Forest Distribution, Elevation Range and Dominant Species Found in Thailand			
Forest Types	Forest Distribution	Elev Range (m)	Dominant Species
1.0 Evergreen Forest			
1.1 Tropical Evergreen Forest	Along the wet belt of the country with high rainfall and no dry period, scattered all over the country.		
1.1.1 Tropical Rain Forest	South-eastern and Peninsular regions	0 - 100	Dipterocarpus spp., Hopea spp., Shorea spp.Anisoptera spp.palms, rattans, abamboos and climbers etc.
1.1.2 Dry Evergreen Forest	Scattered all over the country along the depressions and along the valleys of low hill ranges.	~ 500	Dipterocarpus spp. Hopea ferrea, Anisoptera costata, Alstonia scholaris, Tetrameles nudiflora etc
1.1.3 Hill Evergreen Forest	Scattered all over the country	~1000	Quercus spp., Lithocarpus spp., Castanopsis spp. Etc.
1.2 Coniferous	scattered in small pockets in the North, Northeast, East and Southwest regions	200-1600	Pinus spp., etc.
1.3 Swamp	scattered in the wet region of the country	-	-
1.3.1 Freshwater	along depressions inland	-	Dyera costulata, Palaqium gutta, Scaphium spp., Hopea latifolia, Heritiera littoralis spp. Etc.
1.3.2 Mangrove	along river estuaries and muddy coastlines on the west coast, south and south-east	-	Rhizophora apiculata, Rhizophora macronata, Soneratia spp., Bruguiera spp., etc.
1.4 Beach	common along the east coast, occurs on coastal dunes, rocky seashores and elevated coasts	-	Casuarina equisetifolia etc
2.0 Deciduous Forest			
2.1 Mixed Deciduous	scattered all over the country	50-600	Tectona grandis, Xylia kerrii, Dalbergia cultrata, Dalbergia oliveri, Albizia lebbeck, Accacia spp. Etc.
2.2 Dry Deciduous	scattered all over the country	100-600	Shorea obtusa, Pentacme siamensis, Dipterocarpus spp., Phyllanthus emblica etc
2.3 Savannah	north, northeast and in the eastern region	-	Careya arborea, Accacia siamensis, Accacia catechu etc.

©2012, G..K. Lee. All rights reserved.

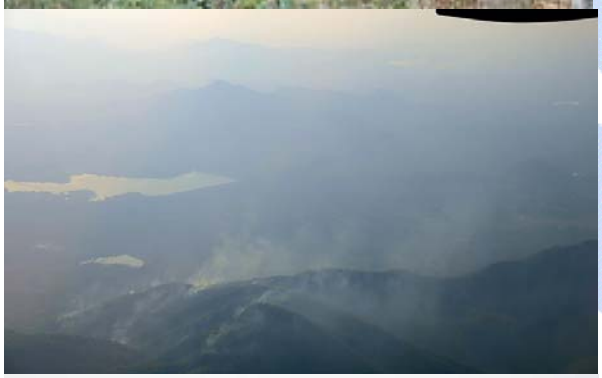
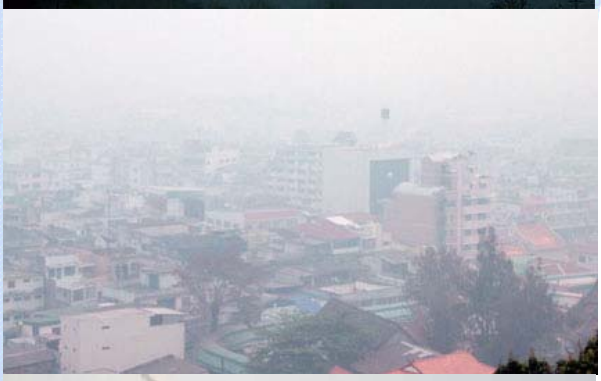
Smoke & Haze Smother the North

Smoke and haze increased over the north despite government efforts to ban burning. In Tak Province, the air quality was also impacted by burning across the border in Myanmar.

Attention focuses on PM10 (particles on the order of ~10 microns or less in diameter). These are small enough to penetrate the deepest part of the lungs and create serious respiratory problems. Thai air quality standards set PM10 at 120 micrograms / cubic meter of air. (Most industrialized western countries set the limit at 50 µm/cm^3.)

Province	PM10 µg / m^3
Chiang Mai	146.81-168.05
Chiang Rai	323.4 -357
Lampang	206.67
Lamphun	150
Mae Hong Son	220.1
Nan	166.1
Phayao	250.2
Phrae	190.9
Tak	277.5

In Chiang Rai's Mae Sai district, officials prepared to evacuate residents of tall buildings. In some areas, fire trucks sprayed water in an attempt to help clear the air. Rainmaking was considered. Two flights sprinkled humidity-boosting chemicals in Chiang Mai, Lampang and Lamphun, as humidity levels weren't high enough to allow the use of rain-making chemicals. Although temperatures cooled in the north, a low-pressure system in the area made conditions unsuitable for rainmaking.

The images above from the internet; educational fair use clause.

©2012, G..K. Lee. All rights reserved.

Much of the burning in northern Thailand involves disposing of rice straw residues. For most farmers, the options are: burning, incorporation, surface retention and mulching, and baling and physically removing the straw. The advantages for burning are killing of deleterious pests and cheaply clearing the piles before planting. But, burning results huge losses of N (nitrogen up to 80%), P (phosphorus, 25%), K (potassium, 21%) and S (sulfur, 4-60%), air pollution (e.g. CO_2 13 t/ha) depriving soils of organic matter (SOM). This loss of SOM is one of the known threats to sustainability.

Incorporation leads to build up of SOM, soil N, P and K. The major disadvantage of using the rice straw is the immobilization of inorganic N. However, N at 15-20 kg/ha as starter dose with straw incorporation increases yield of rice in contrast to burning. Rice residues kept at the surface increases soil NO_3^- by 46%, N uptake by 29%, and yield by 37% in contrast to burning. Residue management practices affect soil physical properties (e.g. soil moisture, temperature, aggregate formation, bulk density and hydraulic conductivity). Soil temperature is influenced through the change in radiant energy balance and insulation. Rice crop residues are highly siliceous, and have the potential of transforming electrochemical properties of acidic soils that reduces P fixation; improving base retention and increasing the soil pH. Rice straw incorporation coupled with organic manure increases yields and improves soil physical condition. Residue incorporation results more microbial activity than residue removal or burning. Thus, if residues are managed properly, then it can mean improving soil properties and sustainable crop productivity.

Rice stubble is plowed under with water added.

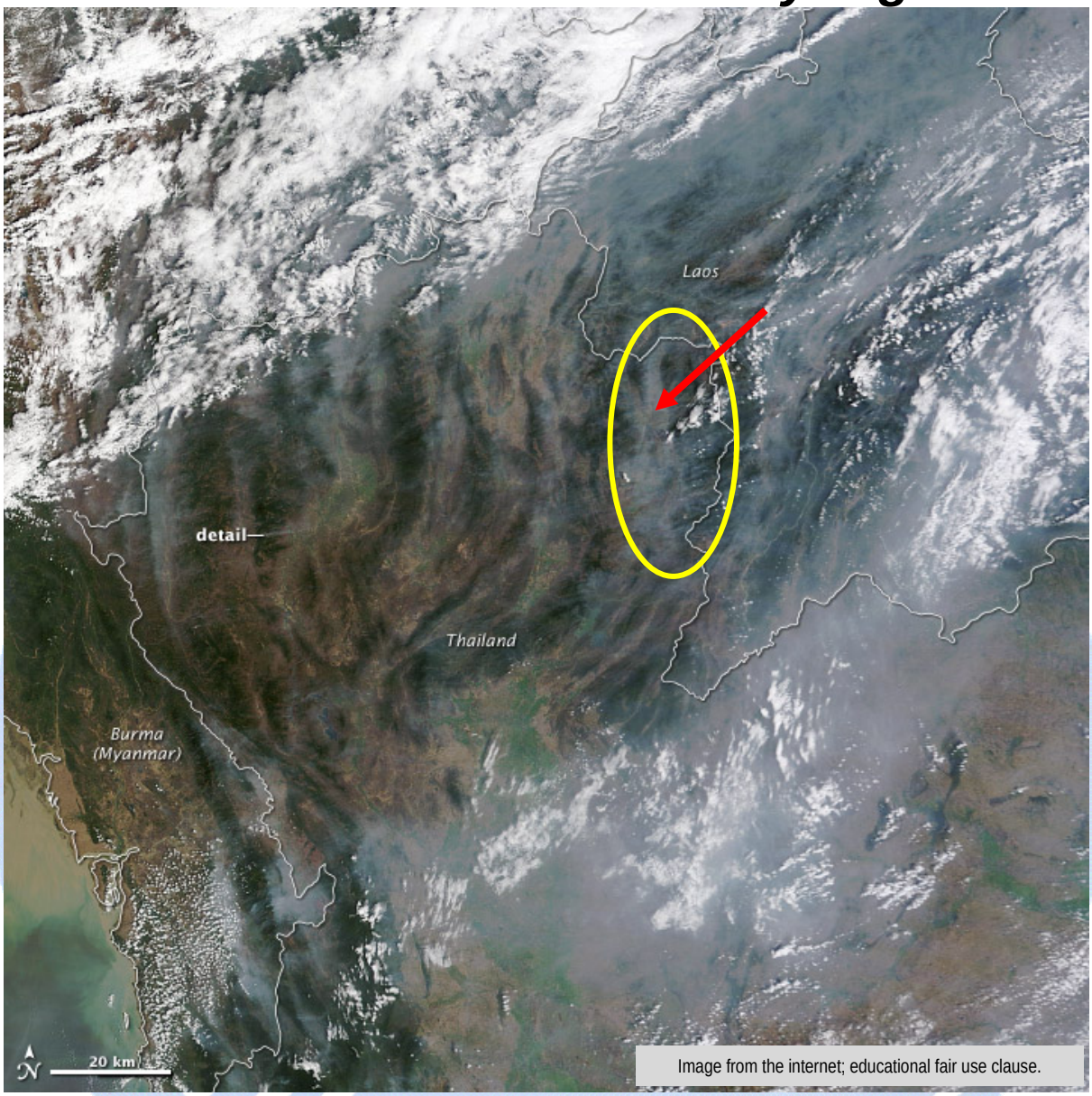
Land if often left fallow because of lack of water or capital to grow a crop in the dry season.

Baling and removing the rice straw for animal fodder has decreased as more farmers shift away from livestock (especially for plowing) in favor of using machinery. The noticeable increased agricultural production results from increasing uses of machinery and synthetic agricultural chemicals. The hidden price paid for this is the long term ecological damage to farm soils.

Small rural family farms are severely undercapitalized. They cannot sustain this level of operational expense. Large agribusinesses are responsible for more production each year. Depleted soils and a cycle of debt doom many small farms and families to poverty. Many abandon the farm seeking jobs in urban areas. More often than not this leads to poverty while smothered in urban air pollution.

©2012, G..K. Lee. All rights reserved.

Northern Thai Smoke: A Really Big Mess



NASA's Terra satellite captured this MODIS (Moderate Imaging Spectroradiometer) natural color image showing the smoke over Southeast Asia. Nan Province is circled in yellow. The red arrow shows our approximate location. The strong North-South parallel mountains-valleys of northern Thailand are similar in appearance to the Basin and Range terrain of Nevada-Utah. The wisps of smoke flow from Myanmar to Thailand and Laos.

How do you know when you have a big problem? Well, how about if folks from 750 km / ~438 mi away can see it?

The full moon on 09 Mar 2012 over Thawangpha is shown at the right. The normally pale white lunar orb is sporting a distinct dark orange cast due to the smoke in the atmospheric path scattering out the other wavelengths and allowing the longer red wavelengths through. I guess it is all a sign of the times.

©2012, G..K. Lee. All rights reserved.

Ideas for Effective Lessons

Some teachers have emailed asking how we get ideas for our lessons. It may sound too obvious, but the best ideas for new lessons come from the students. Ask the students what they have trouble learning. If you make lessons that directly meet their needs, they will tend to study the lessons well.

Image from the internet; educational fair use clause.

Ideas for new lessons can be obvious if you consider the students' point of view.

It seems a major challenge for new teachers is finding "interesting" lessons to hold the attention of their students. This is especially true when teaching English in Thailand. As a required class, students are compelled to be in class. It's not a free choice. This is directly counter to the RTC-TH principle of "self-selection" where students choose to attend training topics in which they have an interest.

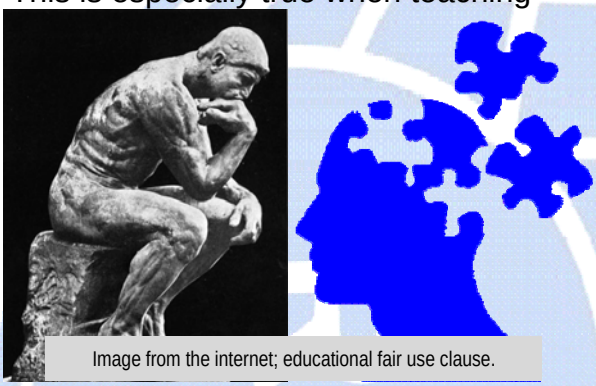


Image from the internet; educational fair use clause.

With some careful thought, pieces fall into place.

Another consideration is the idea that language comes with lots of cultural baggage. The whole "logical" process of a language is associated with many other factors. When I was teaching in China, students were required to use foreign textbooks. There were stories they had to read that contained things unknown in many parts of China. One story talked about a subway system. The students figured out it was like a train but that it ran underground. This was such an impractical thing to them. They all saw trains in the Chinese landscape. But for the life of them, they couldn't figure out why anyone would want to build a railroad underground. It is hard enough to learn English. It must be even harder when the things talked about in English were so unfamiliar to the lives and experiences of the students.

Wats (temples) are found in nearly every village.

Anyone who has tried to study a foreign language can tell you learning new words (vocabulary) is a major hurdle. The old adage of "use it or lose it" applies. Memorizing lists of words to pass an exam falls short of developing any practical facility with the language in the world of work.

Another old saw to keep in mind: "A picture is worth a thousand words." A photo of a common object or scene familiar to the learner stimulates the learning process. They know the name and terms for things in the photo in their native language. Now

©2012, G..K. Lee. All rights reserved.

we can make it a game to learn the words and terms in English. And just as in real life, there's usually more than one word or more than one way phrase involved.

So the basics of RTC-TH lessons rests on these ideas:

- Lessons should be interesting and relevant to the learners.
- Work from the familiar before going to the unknown.
- Use photography of common objects and familiar scenes to stimulate the use of practical daily vocabulary.

Excited students seeing familiar school scenes and faces of their friends showing up in the slide show lessons motivate them to learn more English.

Curiosity is the prime mover in learning. We did a lesson about the making of palm sugar. This is the traditional brown sugar found in Thai markets. It is widely used in making Thai desserts. It is mostly made in the south. So many northern Thai students are familiar with palm sugar but have never seen how it was made. This photo illustrated lesson was an English lesson that taught Thai students something about Thailand. (To see the lesson E-2 How to Make Palm Sugar, visit http://www.neighborhoodlink.com/RTC-TH_Tech/pages and look in the RTC-TH REEEPP at Na Fa Elementary School section for lesson.)

Other example of using familiar everyday events for lesson topics:

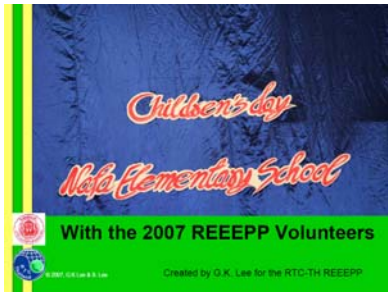
- E-3 What I do each morning before school
- E-5 Children's Day at Na Fa Elementary School
- E-9 How We Start School Each Day
- E-10 Lunch Time at Na Fa Elementary School

The RTC-TH lessons are unlike the lessons in textbook. Color photos of familiar places and faces make the lessons more real for the students. When did you ever see your own face (or those of your friends) in a school lesson? These simple lesson ideas helped the teachers meet one of the main goals for the school: To get students to use English in everyday life.

E-1

E-2

E-8



E-5

E-9

E-10

©2012, G..K. Lee. All rights reserved.

Brown Plant Hopper (BPH) Infestation: A Lesson

The floods of 2011 damaged more than two million hectares of Thai farmland. They also reduced spider populations in the central Chao Phraya rice paddies. It was just another of many converging events contributing to the ever growing Brown Plant Hopper (BPH) infestations plague rice growers. [**Note:** We don't have this pest in our rice paddies…yet.]

Brown Plant Hoppers (BPH) are tiny.

BPH and two of its natural predators. The photos below are not to scale so do not properly show them in proper relative sizes.

Brown Plant Hopper (Nilaparvata lugens)

Pond Wolf Spider (Pardosa Pseudoannulata, shown above, and the Orb Spider (Araneus inustus, pictured below) are BPH predators.

BPH not only feed on the sap of the rice plants. They also spread two kinds of virus: rice ragged stunt virus and rice grassy stunt virus.

Some of the contributing factors to the exploding numbers of BPH are:

- The push to get 2 and 3 rice crops thus providing a never ending food supply for BPH.
- The extensive and improper use of pesticides (especially cypermethrin and abamectin) which tends to kill more BPH predators than it kills BPH.
- The ability of BPH to develop resistance to one of its own hormones used as a control measure.

In the past, the rice cultivation cycle of 1-2 crops per year provided for natural breaks in the food supply for BPH. The push to increase harvests for monetary gain also depletes the soil and causing farmers to rely on using more agri-chemicals. As the BHP population responded to an endless food supply, more aggressive use of insecticides resulted in the loss of many more BPH natural enemies than the BPH target species.

The Thai government and the chemical pesticide industry have joined forces to ban the use of cypermethrin and abamectin. Ironically, these two insecticides have been linked to actually boosting BPH populations. But habits are hard to change, and the proponents of the ban seem resigned to making little difference.

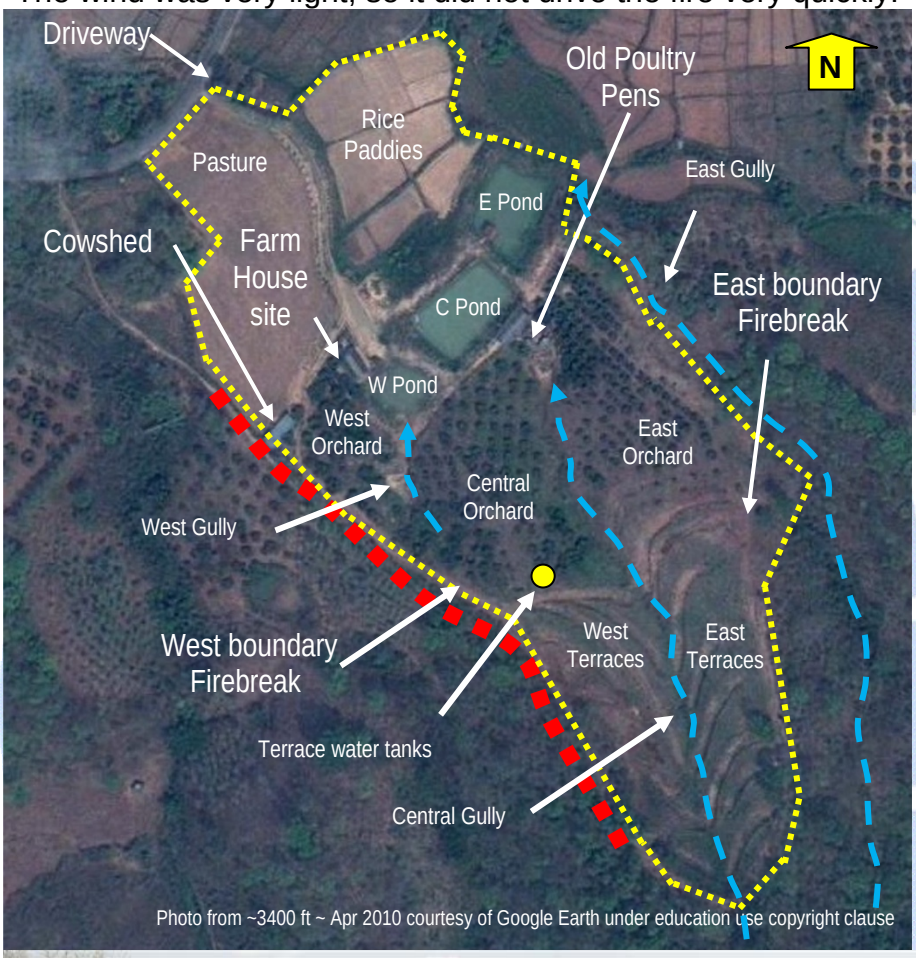
Once again, integrated pest management and biodiversity seem to be ignored by many farmers as ways to deal with crop pests.

Images for this article from the internet; educational fair use clause.

©2012, G..K. Lee. All rights reserved.

Our Western Firebreak Worked

A fire started on land to the west of (see dotted red line in the photo below) and spread to our farm. Luckily, we had prepared for the dry season by clearing the firebreak road. The creeping fire was physically low and close to the ground. The wind was very light, so it did not drive the fire very quickly.



Approximate farm boundary in yellow dashed line. The farm can be seen as 3 steps going up from the paved road (top left corner of the photo).

Lower Section
- *Pasture*
- *Rice paddies*

Middle Section
- *East fish pond*
- *East Orchard*
- *East gully*
- *Central fish pond*
- *Central Orchard*
- *West fish pond*
- *West Orchard*
- *Terrace water tanks*
- *West gully*

Upper Section
- *West Terraces*
- *East Terraces*
- *Central gully*

View of the western boundary firebreak(left) from the terrace water tanks (yellow dot on the aerial photo).

In preparation for the dry season, efforts were focused on clearing the firebreaks. The greatest fire hazard potential is from the land to the west of our farm. Apparently someone was hunting on the land. They built a small fire that got out of control. The land owner did not know anyone was on her land at that time. Thank goodness the winds were calm.

©2012, G..K. Lee. All rights reserved.

Fire came from the west (right of the photos) King grass at the sides of the west terrace access road firebreak burned (see red arrows), but the fire did not get into the orchard.

Looking up the firebreak (left photo) and down the firebreak (right photo) shows it was effective in stopping the fire from reaching the west orchard.

Apparently heat from the fire singed some leaves of a couple of longan trees near the start of the west terraces near the water tanks (see yellow arrow in the photo below to the right). The vegetation on the west side of the boundary fence was higher there (yellow oval in left photo below). The greater amount of fuel resulted in more heat.

We got lucky this time. The low intensity, slow moving creeping fire was easy to suppress using simple hand tools. We need to build up our firefighting equipment inventory, especially water pumps, hoses, and portable hand pump water tanks. The Jun 2011 fire that destroyed the farm house left us without a place to store tools and equipment on the farm.

©2012, G..K. Lee. All rights reserved.