



RTC-TH Apr 2012 Update 2

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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

Sawadee Pee Mai! Happy Thai New Year



According to an ancient tale, after the death of King Kabilaprom, each of his 7 daughters were assigned a day of the week to carry his head around Phra Sumane Mountain. The daughter assigned to the day of the week on which Songkran occurs will honor that year in memory of her father. Kimitatevee is assigned to Friday, the day of Songkran

for 2012, the year of the Dragon, and a leap year. Her symbols include a sword in her right hand, a lute in her left, topaz, bananas, a lotus blossom, and rides on a buffalo.

The Dragon is a water animal and is associated with rain. The prediction is for massive rains at the start of the year, moderate rains for the middle of the year, and light rains at year's end. We have to wait and see.

This is the time of year to clean things up before the new year. So many Thais are busy at home, dusting and washing. And this is mirrored at the temples. In past times, water used to wash the statues of Buddha as the temple was collected and used to gently sprinkle on people. This was a way to share blessings and good wishes for the new year in a refreshing way. Remember, April is in the hot, dry season in Thailand. So sprinkling water can be a refreshing way to cool down.



Images in this article from the internet: educational fair use clause

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This year many parts of Thailand are experiencing drought conditions. Despite this, water splashing was in full swing. Participants ranged from people along roads with buckets to hoses to pick-up trucks with barrels of water. This is not a good day to go out with expensive cameras or cell phones. In city areas, traffic slows to a crawl when windshields are obscured with water. Drivers need to be extra careful as children dash out to splash cars, trucks, and motorbikes.



Hose or bucket? Either way you get wet.



Truck-borne water splashers cruising for targets.

Many people working in cities flock to their rural provincial roots to pay respects to elder relatives. This is a major time for family travel.

Another common practice is the washing elders' hands to show respect, ask forgiveness for any transgressions during the past year, and / or give thanks and good wishes for the new year. Photos of deceased relatives are also sprinkled lightly with water as family memers pay their respects.



A neighborhood group ready to defend themselves



Our family gathers to pay respect to elders.



Pi Oi washes Mom's hands with Fon looking on.



Saifon pays respects to her deceased grandparents.

2012 Rainfall Score Card

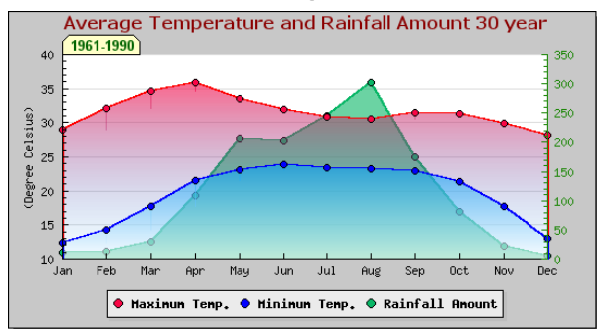


Image from the internet: educational fair use clause

| 30 Yr Average | | | 2011 | | 2012 | |
|---------------|---------------|------------|---------------|------------|---------------|------------|
| Month | Rainfall (mm) | Rainy days | Rainfall (mm) | Rainy days | Rainfall (mm) | Rainy days |
| Jan | 11.0 | 2 | 1.52 | 3 | 17.78 | 3 |
| Feb | 12.6 | 2 | 14.48 | 2 | 1.01 | 1 |
| Mar | 29.2 | 3 | 69.33 | 6 | 31.24 | 2 |
| Apr | 108.0 | 9 | 98.55 | 10 | | |
| May | 206.2 | 17 | 208.53 | 22 | | |
| Jun | 202.4 | 17 | 396.20 | 17 | | |
| Jul | 244.1 | 21 | 340.87 | 19 | | |
| Aug | 302.3 | 22 | 321.05 | 18 | | |
| Sep | 175.6 | 16 | 371.08 | 20 | | |
| Oct | 80.4 | 9 | 147.57 | 7 | | |
| Nov | 22.7 | 4 | 8.12 | 2 | | |
| Dec | 5.9 | 1 | 0 | 0 | | |
| Total | 1400.4 | 123 | 1977.3 | 126 | | |

Red Box = northern Thai SW Monsoon Season
Green shading = data above 30 year average for Thawangpha

about 8 km. Yet there are times when it is pouring cats and dogs on the farm and the government weather station reports "0" mm of precipitation. Farmers wanting to harvest rain water need to get weather data for their particular location. This is the focus of the RTC-TH G.R.O.W (Getting Real On-farm Weather) program. Information is on the RTC-TH website.

The 2011 floods saw the unusual convergence of several consecutive tropical storms/depressions with already nearly full reservoirs against La Niña pattern conditions. La Niña patterns can lead to increased precipitation and tropical activity in Australia and Southeast Asia. Some experts felt these would be unlikely to converge again in 2012. It's hard to predict the future. So keep up the score card and you will see for yourself how it all plays out. 🌍

[Note: See the article about local weather observation discrepancies (pp. 5-6).]

The devastating 2011 floods are history. Nan now has drought from Feb on. What's in store for 2012? No one can tell for sure, but here's a score card if you want to follow along and see what happens.

The chart on the left shows the 30 year climate summary for Thawangpha. The table below shows the numerical data (e.g. average rainfall and number of rainy days for each month) for the 30 year average (climate summary), for 2011 and the score card for 2012. We will update this table throughout the rainy season. This will give you a handle drought situation.

It is important to note that rainfall at any particular locality can vary widely from the official government weather station. This is especially true in a mountainous area such as Nan. The distance of the government weather station in Thawangpha to our farm is

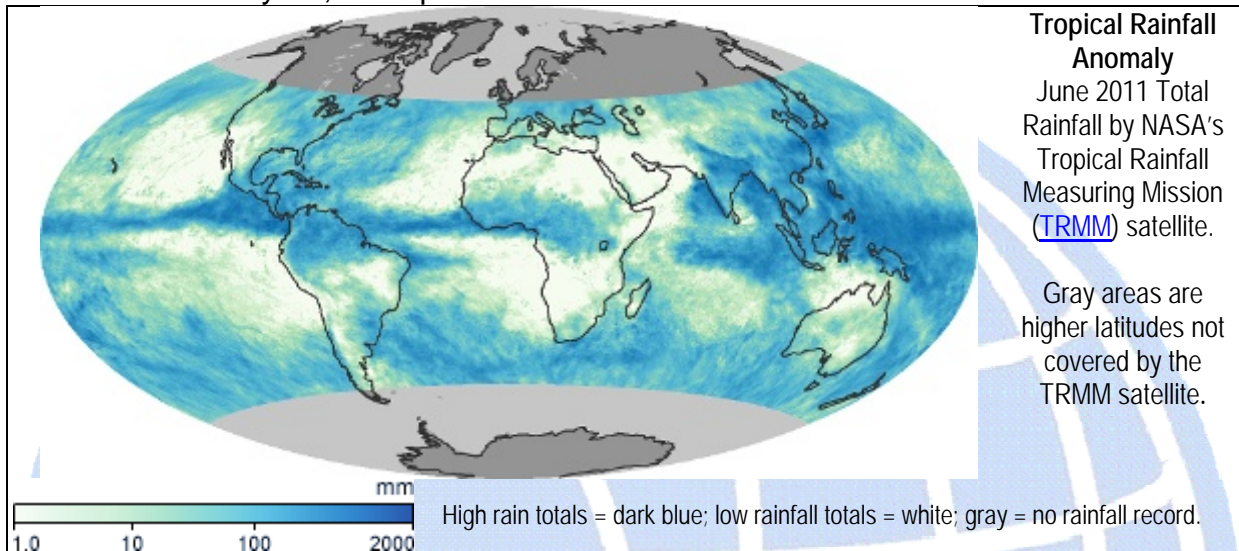


Thai Meteorological Dept, Thawangpha Office

Weathering the Changing Times

We seem to be living in times of great change. Major global events seem to be beyond prior human experience or at least the imaginations of most of us. The 2011 floods in Thailand seemed to be a convergence of anomalies.

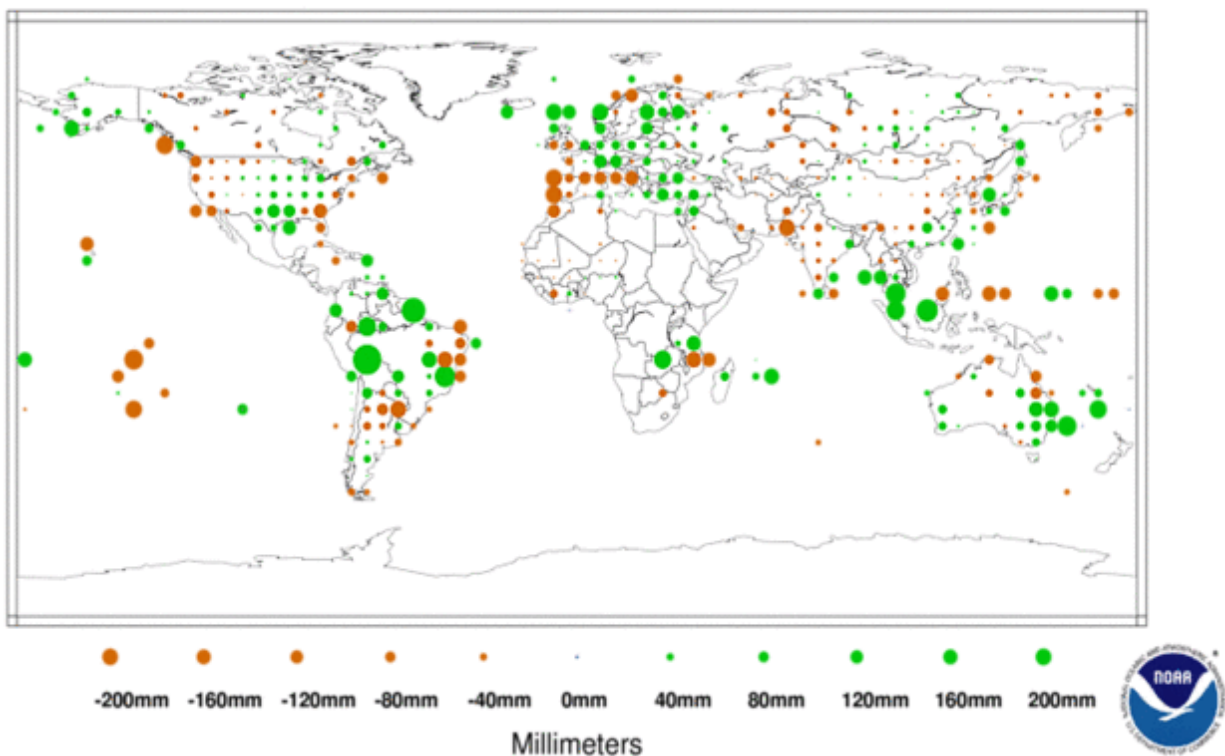
It remains to be seen what will happen in the rest of 2012. But traditional Thai wisdom for the Thai New Year indicates rain will be heavy at the start of the year, moderate in mid-year, and sparse toward the end. We have to wait and see. 🌍



Precipitation Anomalies Dec-Feb 2012

(with respect to a 1961-1990 base period)

National Climatic Data Center/NESDIS/NOAA



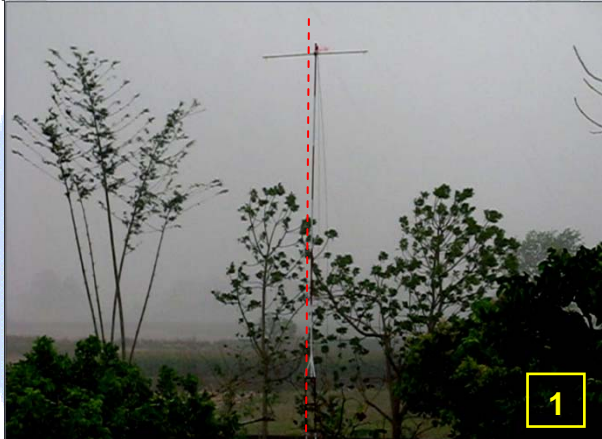
A Recent Thunderstorm in Ban Wangwa

March went out with a **Roar!** A thunderstorm hit on 31 Mar dumping about 19 mm ($>3/4$ "") of rain in about 45 minutes. We videotaped the radio mast as the top swayed about 1m in the gusting winds. We did not have any guy wires to support the mast. We wanted to see how it would do in the wind.

The photos below were taken from the videotape. You can readily see the upper portion of the mast bends in the wind. The red dashed reference line is perpendicular to the concrete-filled 350 kg (>700 lbs) tractor tire base and tower section. Keep in mind the upper mast portion is 2.5 cm / 1 inch steel pipe.



The radio mast in calm clear weather.



We are pleased to report that all is well. The mast weathered the storm quite (to our great relief). Later that day, we were surprised to see the official weather report for the 3-hour time frame of the video. The reported wind velocity: "calm" (<1.5 km/hr or less than 1 mph). The weather station is ~200m / 600 ft across the highway from our mast. Our visual observation referenced to the Beaufort wind scale estimated the wind was gusting 45-55 km/hr or 28-35 mph. Granted, our observation was subjective. But we think most people would agree the 2.5 cm / 1 inch steel pipe mast in our photos was not deflected ~1 m by a "calm" wind.



The "calm" winds loosened 4 roof panels



Puddles on the 2nd story reference library floor.



Leaky window in the storage room.

The same "calm" winds loosened 4 corrugated sheet metal roof panels on the Smog Check building at the back of our property. Rain water got in soaking only one small book and some papers. Otherwise there wasn't much damage to the RTC-TH reference library on the second floor. Some water dripped down the wall and made puddles on the vinyl floor covering. The bottoms of a couple of storage boxes got wet. The contents are all sealed in plastic bags. In an adjacent store room, rainwater leaked through the wood window. Some water got on a few boxes and on the floor near the window. The contents of these boxes are also sealed in plastic bags.

From the second story, the water dripped through the gaps in the wood plank floor (nothing like a fine hardwood floor) flooding the office on the ground floor. Unfortunately some smog check records got wet and need to be dried.



The only wet book got hung out to dry

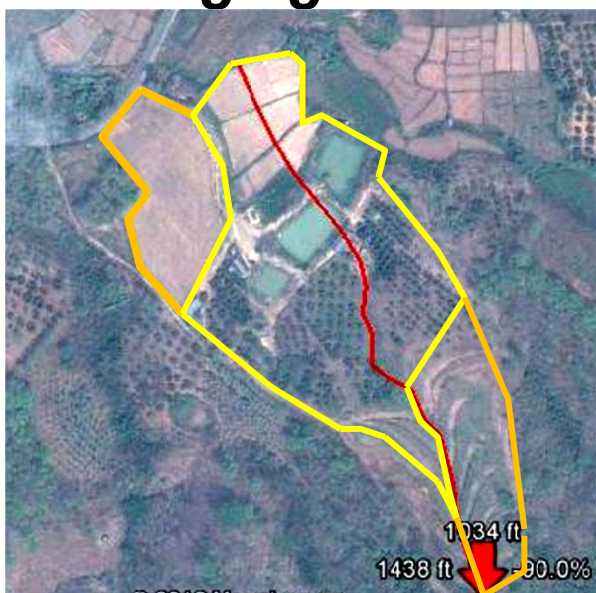


About an inch of water covered the office floor



Some documents need to be dried out and saved.

Managing Water Resources on Our Farm



The original farm (yellow outline): 1) started at the rice paddies (top center), 2) expanded to the area of the fish ponds; 3) then up to the orchards; 4) and finally to the west side of the Central Gully (red line). Several years after her father passed away, Saifon and Greg bought the pasture land and the east side of the Central Gully (orange outline). The Central Gully and fish ponds are still the primary water supply features on the farm.

several years after her father had passed away. They developed a water resources management plan consistent with the fundamental water supply for the farm.

Every farm is a unique combination of environmental components: land, air, water, and living things. The story of the RTC-TH demonstration farm goes back to Saifon's parents took unwanted land, claimed it for their use, and actively worked to clear it and create their farm. The King's Theory guided their efforts.

The very essence of any farm is its soil and water resources. The land they claimed had no access to irrigation water. They had to depend on rainfall which came mostly in the SW monsoon season (May to Oct). Upslope from the farm was a protected forest area. A gully connected the forest to the farm. Other than rain falling directly on the farm, surface runoff from the monsoon rain falling on the forest flowed down the gully. Through the year, subsurface seepage also made its way down slope to the farm.

Saifon and Greg met and married several years after her father had passed away. They developed a water resources management plan consistent with the fundamental water supply for the farm.



Our water comes from the sky and the forest. The upper slopes are terraced and planted in trees

Today the farm is ~44 rai / 17.4 acres. The farm water plan has 5 main sections. Since gravity causes water to flow from high to low, the sections are based on elevation. From high to low, they are: the terraces, the orchards, the holding ponds, the fish ponds, and the rice paddies. These are shown on a farm profile roughly following the axis of the Central Gully (the red line in the photo at the top of this page). The elevations are approximated from Google Earth not actual surveys.



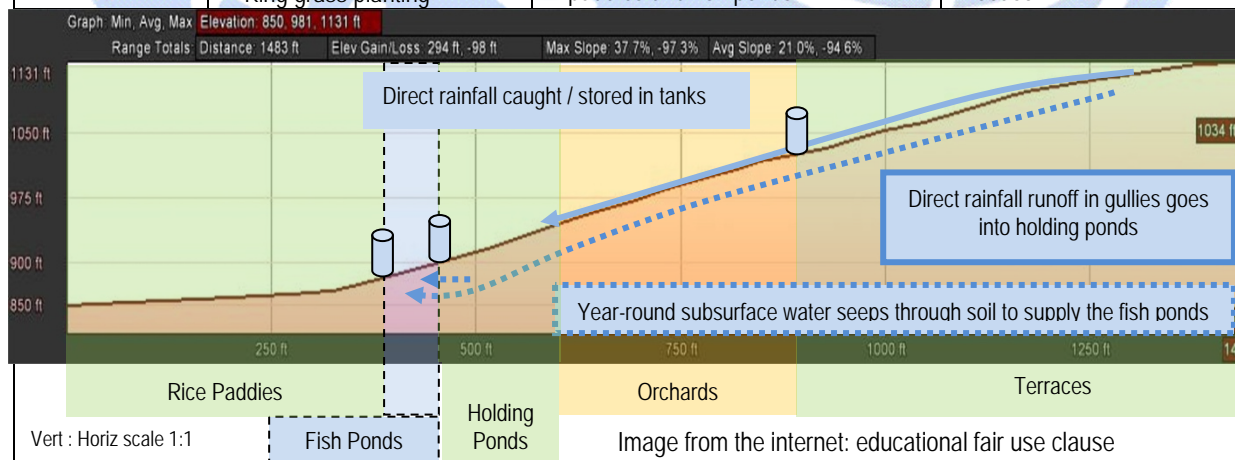
Our fish ponds from the top of the orchards.

Farm Terrain Profile NW to SE: Annotated Water Management Summary



The table and terrain profile are a general representation of the various sections of the farm showing their relative position and elevation to each other. Water flows from high to low. We can only manage the water on our farm. Once it leaves the rice paddies, it is gone and no longer a resource for us. We cannot impound the water in the rice paddies due to the dynamics of rice cultivation and in consideration of downstream users. Enhanced soil moisture retention may be our best long range strategy to minimize evaporative water losses and try to assure the viability to sustain growing crops.

| Elev (AMSL) | Water conservation actions | Plans | Functions |
|---|--|---|---|
| Terraces High ~1034 m Low ~1023 m | <ul style="list-style-type: none"> • Terracing • Swales • Mulching • Composting • Planted teak trees • King grass planting | <ul style="list-style-type: none"> • Redirect flow on East and West access roads to terraces • Increase planted flow paths in East, Central, and West gullies | <ul style="list-style-type: none"> • Slow surface runoff and give it more time to soak into the soil • Protect the long-term subsurface seepage to supply the fish ponds • Possible cash income from teak, bamboo, long an, intercrops, etc. |
| Orchards Elev (AMSL) High ~1023 m Low ~883 m | <ul style="list-style-type: none"> • Swales • Mulching • Composting • Water Tanks (2) | <ul style="list-style-type: none"> • Worm composting throughout • Intercropping • Drip irrigation • Planted flow paths | |
| Holding Ponds Elev (AMSL) ~937m | <ul style="list-style-type: none"> • Water holding ponds (2) • King grass planting | <ul style="list-style-type: none"> • Deepen Central Gully holding pond • Make new pond between East & Central Fish Ponds & rice paddies | <ul style="list-style-type: none"> • Impound gully runoff • Sedimentation of runoff • Overflow goes to the fish ponds. |
| Fish Ponds Elev (AMSL) High ~903m Low ~883 m | <ul style="list-style-type: none"> • Fish ponds (3) • Water Tanks (8) • King grass planting | <ul style="list-style-type: none"> • Repair berms; Seal inner surfaces • Overflow from Central to East pond • Water level gauge in each pond • Monitor evaporation loss | <ul style="list-style-type: none"> • assure ample water for growing rice • source of added income |
| Rice Paddies Elev (AMSL) High ~864 m Low ~850 m | <ul style="list-style-type: none"> • Mulching • Composting • EM Bacteria • Green manure • King grass planting | <ul style="list-style-type: none"> • Improve dikes and water gates • Consider integrating fish and ducks into the rice paddies • Crab & eel exclusion to protect rice paddies and fish ponds | <ul style="list-style-type: none"> • traditional staple crop for the family diet. • Supplementary crop growing area in dry season |



Notes: The terrain profile was prepared using Google Earth. It is not the result of an on-site leveling survey. Vertical and horizontal dimensions are relative and should not be used in calculations requiring precision results. Farm structures with 8 water tanks are at the elevation range of the fish ponds. The tanks above the orchard were the first water tanks on the farm and were built by Saifon's father.



The view of our farm from the upper terraces looking NW across the Nam Yang Valley.

The water resource management plan begins with the key landscape features at the core of the farm's water supply: to forest above the farm, the Central Gully, and the upper slopes the gully incises. Direct rainfall comes via the SW monsoon (May-Oct) and from random summer thunderstorms (~Mar-Apr). Ironically, during the rainy season, we have limited access to a small 20 cm wide irrigation ditch.

The effects of climate change were taken into account for planning. The Himalayan glaciers grow smaller. SE Asia faces increased risk of droughts. Although the monsoons may continue to operate, the rainfall may be more intense and come over shorter time spans. The flood-drought pendulum swings to greater extremes and spends little time in mid-swing.

The forest is under the control of the government. About all we can do is to advocate for its continued protection and to make others aware of the growing danger of wildfires as climate change brings hotter, longer dry seasons and droughts.

Recognizing the importance of the forest water shed, the basic plan is to slow the water flow from the forest to the farm. This would give the water more time to soak into the soil.

We cut terraces in to the upper slopes of the farm to slow the rainwater surface runoff flowing into the Central Gully. The flat portion of the terrace acts as a swale (shallow depression) to hold water to give it time to soak into the ground. Mulch was applied to protect the bare soil until the planted ground cover could take hold. Various grasses for grazing were also planted. Grasses tend to grow quickly to help anchor the soil. We planted teak on the terraces. This was an investment in both the watershed and a future timber farm asset as an inflation hedge. Teak



We terrace the upper slopes to slow the water flow.



Teak trees planted to build the watershed



The original water tanks still in use today.



The holding ponds in the West and Central gullies flow into their respective fish ponds.

overflowing in the rainy season. This also re-charges the ground water seeping to the fish ponds. In the rainy season, we put fish in these ponds for mosquito control.

In orchards, we use swales and mulching to improve soil moisture retention. In the future, additional swales will be selectively added as needed.

We experimented using corn cobs for mulch. The photo on the right shows the corn cob mulch after 2 years. It is very effective for weed control and soil moisture retention. We intend to expand the coverage throughout the orchards. This will also substantially reduce the labor and costs for grass cutting.

can be harvested when it is 10-20 years old. The earliest we can consider cutting the teak would be ~2019.

So the watershed development of the upper slopes consisted of terracing, swales, mulching / composting, and planting ground cover, grasses, and teak.

Water harvesting was a new tactic in the upper and lower orchard area. Saifon's father built 2 water tanks above the orchards on the west side of the Central Gully. He used to pump water from the Central Fish Pond to fill these tanks. We keep this as an option, but put a rain catcher on the tanks to fill them with rainwater first. This way any water from summer thundershowers reduces the need to pump water uphill.

Water flowing down the Central Gully and the much shorter West Gully is collected in smaller separate holding ponds. The ponds temporarily store rain water to keep the fish ponds from



Mulch reduces raindrop impact, weeds & evaporation

Mulching and composting go hand in hand. Mulch ultimately breaks down to become compost. Compost helps to boost soil moisture retention by:

- Adding organics to the soil
- Creating habitat for soil organisms (especially earthworms)
- Increasing earthworm populations. The worms till the soil, make spaces for air, water, and roots in the soil. They enrich the soil and improve soil structure.

By composting “in-place” we reduce labor costs in handling and moving it around the farm. Adding biochar to the compost (1 part to 4 parts compost) is another way to boost soil moisture retention. The biochar also holds nutrients and releases them slowly into the soil. We fortify our compost using on-farm materials (see 2011 Feb RTC-Update article “On-Farm Materials for “Fortified” Compost, p. 4)



Compost + biochar to increase soil moisture retention



Mulching inter-cropped green tea in the west orchards

Inter-cropping in the orchard helps promote bio-diversity. Green tea is grown among the various fruit trees in the orchards west of the Central Gully. We got the plants free as part of the award for being the top farm in the district. Mulch (from clearing grass and weeds before they go to seed) is being put around the tea seedlings to prepare them for the dry season. The tea can be picked for regular tea or to be made into a preserved “tea ball” tonic used by many Thai farm workers.

From the beginning, the Central Fish Pond was the main water resource built for the farm. Following the King’s Theory, Saifon’s father and mother were the first farmers in the local area to build a fish on their farm. This took advantage of the forest watershed and Central Gully above the farm. Everything else we have done remains consistent with this first step. We now have 3 fish ponds on our farm. In light of climate change forecasts, we are considering 1 or 2 more fish ponds.



The Central Fish Pond is a pillar of the farm's water management plan. Overflow goes to rice paddies (arrow).



The West Fish Pond was the second pond built. It overflows to the Central pond (to right out of picture).



The East Fish Pond used to be a rice paddy. Overflow goes to the east paddies.

Ground seep is the primary water source for all 3 fish ponds.

- The West Fish Pond gets ground seep year-round from the West Gully and ground seep in the rainy season. Overflow from 2 rainwater storage tanks at the farmhouse goes to the West pond. The West Fish Pond overflows to the Central pond.
- The Central Fish Pond gets year-round seep from the Central Gully as well as Central Gully surface runoff in the rainy season. Overflow from 2 rainwater storage tanks from the pig shed goes to the Central Pond. There is one overflow from the Central pond to the west rice paddies. Pond drainage for maintenance goes to the rice paddies. **[Note:** This pond is higher than the East Fish Pond, but there is no overflow to the East pond.]
- The East Fish Pond gets underground seepage from the East and Central Gullies. During the rainy season, some surface runoff from the East Gully gets into the East Fish Pond. Overflow and pond maintenance drainage for this pond goes to the east rice paddies.

The farm house and pig shed were built near the fish ponds. We lost the farm house in a fire in Jun 2011.



The farm house water tanks have not roof catchment since the fire of Jun 2011.

The farm house had 4 tanks. The last pig shed (dismantled Feb 2012) had 3 tanks. The cow shed has 1 tank. **[Note: This tank overflows to the pasture.]**

A top priority is to rig rain catchers on the tanks at the house and pig shed sites before the start of 2012 rainy season. We will need the water for the dry season starting Nov 2012-Apr 2013.



The pig shed tanks lack any roof catchment area.



The Cow Shed tank: "the last man standing"

The effort to secure water for the farm all started with the need to supply water for the original rice paddies. They are at the lowest elevation of the farm. The King's Theory starts with enabling farmers to be self-sufficient in growing the annual rice supply for the family. A fish pond was to be a way to assure having an adequate water supply for the rice crop. So this is what Saifon's parents set out to do. And they succeeded. In the old days, being self-sufficient in rice was a significant landmark accomplishment for a farm family.



The rice paddies by the fence line (red dashed line) are the point of no return for our water.

Times have changed. The standard of living has improved markedly. But the core fundamentals of the farm remain the same: soil and water. Climate changes bring new challenges especially in terms of the water supply and longer droughts. Water tanks are a very expensive storage option. Ponds hold vast amounts of water and are cost effective relative to tanks. But ponds are open and lose water by evaporation. We see soil moisture storage as having great potential for our farm. We must also work on reducing water use in the future.



Saifon and Greg reviewing the 2012 water plan.

Below is a summary of some of the topics that came up in brainstorming about our water management plans. There is nothing really new or innovative here. All of these topics use existing technology. Most are low cost. Some involve more labor than others. If we implement any of these, it will be a juggling act of time, costs, and available labor. They cannot all be done at once. Flexibility is the key. Knowing the various choices lets us pick and choose as the circumstances and opportunities allow.

The bottom line is we must prepare to hotter, drier times ahead. Droughts may be more frequent and last longer. Rain may come less often, but could be more intense when it comes. So we must be able to catch and store it when we can. Then we must make it last as long as we can. ●

| Actions to Consider | | | |
|-------------------------|--|--|--|
| | Location | Method | Purpose |
| Increase Water Storage | Terraces & Fire breaks | Small rainwater harvesting tanks (either alone or with shade structure for workers or animal pens) | Fire fighting |
| | | | Drip irrigation |
| | | | Water for livestock |
| | Central Gully | Deepen Central Gully holding pond | Increase storage capacity |
| | Central & West Gullies | Planted flow paths to slow water flow | Maintain and replace planted flow paths in all segments of the gullies |
| | Rice paddies adjacent to Central and East Fish Ponds | Dig new fish / water holding pond(s); lost rice paddy area can be made up by planting dry land rice in the pasture area. | Increase storage capacity and reduce water losses by seepage from fish ponds |
| | Orchards | Make / use more swales, worm composting pits, bio-char, and intercropping | Improve rain infiltration and soil moisture retention capacity |
| | | Make tree wells especially for trees on slopes | |
| | Garden beds | Worm composting, bio-char, drip / gray water irrigation | |
| | Terrace access roads | Re-direct down slope flow toward terraces to minimize soil erosion on / along the roads | Slow and hold water higher up slope rather than flowing down the road making gullies |
| Reduce Water Use/Losses | Structures | Grade all ground level floors to drain toward a garden bed | Any wash water or accidental "flood" water goes to a garden bed |
| | Parking areas & access roads | Open pavers or medium gravel to allow rain water to enter the soil. | Allow rain water and vehicle wash water to infiltrate the soil; avoid runoff |
| | Design / Construction of new farm house & structures | Gray water systems | Use gray water to irrigate garden beds |
| | | Composting toilets | Reduce / minimize creating "black" water; recycle nutrients on the farm |
| | | French drains | Direct water away from structures to garden beds or fish ponds |
| | Water tanks | Repair or replace tank covers | Reduce evaporative losses |
| | Overall Farm | Set up G.R.O.W. station | Base-line on-farm weather data needed to monitor farm conditions |
| | | Extensive mulching | Reduce need for grass cutting labor and attendant water losses |
| | | Deep drip pipe irrigation for all new trees | More efficient use of water |
| | | Select & grow / eat crops requiring less water | Better prepare farm for future drought conditions |
| | Selected garden beds | Inter-crop in orchards for crops not needing full direct sunlight | Reduces evaporative losses |
| | Ponds | Shade the ponds | Plant trees on west ends of ponds |
| | | Seal inner down slope pond faces using dirt-crete | Reduce / stop pond leakage |
| | Pond & Rice Paddy margins | Grow plants with greater water needs here | Better utilization of available water |

Meet Some Folks on the GERC Net

The RTC-TH EmComm (Emergency Communications) program is recognized as an Auxiliary International part of GERC (Glendora Emergency Response Communications) in Glendora, CA. This grew out of a friendship of Mark (N7YLA, founder of GERC) and Greg (HSØZHM, co-founder of the RTC-TH).

GERC conducts a radio net Tuesday evenings, 2030 hrs Pacific Time (except for the 3rd Tuesday of each month). It is a way for GERC members and friends to exchange information and ideas related to emergency communications, ham radio, news of interest and is an easy way to check to make sure your radio equipment is working. Any amateur radio operator can join the Net. Stations beyond VHF range of Mark's station can log in to his EchoLink® gateway at node #358124. Join us! 🌐



Greg (HSØZHM) checks in to the Net by EchoLink®.



EchoLink® #358124



KG6TRD

Richard Anderson



KG6TQV

Frank Bigelow



KJ6QCM

Bruce Bolton



KG6VBM

James Burton



KC9TIJ

George Cooper



KG6TQT

Jim Dowdle



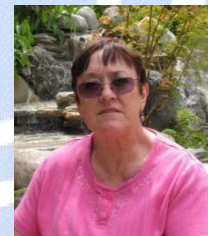
KE6YGF

Rob Foth



KJ6OOH

David Gordon



KG6RFJ

Carolyn Hayden



N7YLA

Mark Hayden



HSØZHM

Greg Lee



KI6CEW

Florante Pineda



HSØZAZ

George Preno



KI6NQG

Dennis Swink

Amateur radio provides opportunities for international understanding, friendship, and mutual assistance in time of emergencies.