

# **Rural Training Center – Thailand (RTC-TH)**



**Community-based Environmental Education  
for the Self-sufficiency and Sustainability of  
Small Rural Family Farms**



# Preparing for Emergencies **SHELTER**



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Created by G.K. Lee for the RTC-TH EmComm

**EP-2**



# An Emergency Preparedness Training Series presentation



Rural Training Center-Thailand  
Emergency Preparedness Community Service Program

**Ready to serve and sustain our community**

For other lessons in the series e-mail [rtc2k5@gmail.com](mailto:rtc2k5@gmail.com)

[www.neighborhoodlink.com/org/rtcth](http://www.neighborhoodlink.com/org/rtcth)

# The EP Lesson Series





# A part of the RTC-TH EmComm Program

The Rural Training Center-  
Thailand Emergency  
Preparedness program is a  
community service effort to  
provide emergency

preparedness training for local  
community self-sufficiency and  
sustainability in times of need.



# The Rural Training Center-Thailand (RTC-TH)

is an all volunteer  
organization providing  
community-based  
environmental education  
for self-sufficiency and  
sustainability of small  
rural family farms

[www.neighborhoodlink.com/org/rtcth](http://www.neighborhoodlink.com/org/rtcth)

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# The lessons were adapted from existing RTC-TH REEEPP program lessons

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# REEEPP

## Rural Environmental Education Enhancement Pilot Program



An innovative, non-traditional community-based environmental education program integrating math, science, geography, English language, and technology lessons for environmental stewardship using interactive experiential learning in outdoor settings at Ban Na Fa Elementary School, Nan Province, Thailand.



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The Rural Training Center-Thailand was created to honor the life and memory of Mr. Tang Suttisan, a father, farmer and former custodian of Ban Na Fa Elementary School who appreciated and valued education.



# Basic Survival Guidelines

Depending on your situation, in general, you can expect to live for:

- 1-3 minutes without air
- 15 minutes to a few hours if you cannot maintain your core body temperature
- 1-7 days without water
- 1-2 weeks without food
- 1-2 months without shelter.







# Shelter: Critical Functions

In an emergency situation, many people may be forced from their homes. They need shelter for:

- Protection from the weather
- A safe place to rest and get first aid for injuries
- A place to prepare and eat food
- Regaining stability and gathering family members





# Shelter: Protection from Weather

Different seasons are associated with different emergencies.

Disaster Type	Warm/Wet	Cool/Dry	Hot/Dry
Severe Storm	X		X
Flood	X		o
Landslides	X		o
Lightning	X		o
Wildfire		o	X
Disease	X		o
Earthquake	?	?	?

**X** = primary season    **o** = secondary season

Emergencies can result from combinations of multiple disasters.







# Shelter: Protection from Weather

From North Thailand Climate Data During 54 years (1951 - 2004)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Tropical Cyclones	-	-	-	-	5	2	9	17	23	15	1	-	72
Thawangpha Rainfall (mm)	11.0	12.6	29.2	108.0	206.2	202.4	244.1	302.3	175.6	80.4	22.7	5.9	1400.04
Seasons	Winter	Summer				Rainy (SW Monsoon)					Winter (NE Monsoon)		
Ave Temp	23.1°C	28.0°C				27.3°C					23.1°C		
Temp Range	17.1-30.8°C	21.4-35.8°C				23.7-32.2°C					17.1-30.8°C		
Ext Temp	0.8°C	44.5°C									0.8°C		
Rainfall (mm)	105.5	182.5				952.1					105.5		
	Need warmth	Need shade & more water				Need to keep dry and warm					Need warmth		



Different seasons call for different shelter needs and preparations.



# Shelter

Shelter is about protection from the weather and climate elements. The main items of concern are:

- Clothing / bedding
- Housing, tents, tarps, shade cloth
- Mosquito nets
- Sanitation/First Aid





# Shelter: Keeping Warm

Wet clothes and wind take heat away from your body. It is important to keep dry; stay out of the wind and rain.







# Hypothermia

Hypothermia is when your inner (core) body temperature is 35°C / 95° F or lower.

Normal body temperature is 37°C / 98.6°F.

***It does NOT have to be winter or snowing for people to suffer from hypothermia.***

**It can occur at 15.5-18.3°C / 60-65°F.**

It can happen any time people get cold / wet or even just cool / damp in windy conditions.

The elderly and infants may be more likely to be affected first.





# Hypothermia

Watch for these symptoms and get aid fast.

## Adults

- shivering, blue lips
- confusion, memory loss
- drowsiness, exhaustion
- slurred speech

## Infants

- appear to have very low energy
- skin appears bright red, and feels cold

### REMEDY

- Seek shelter (get dry, keep out of the wind)
- Keep warm

Most body heat is lost from the head; keep it dry and covered.





# Hypothermia

Wind Chill is mostly used in winter conditions.

But many cases of hypothermia can occur with air temperatures of -1.1 to 10C / 30-50F

Most Wind Chill tables are for temperate climates and don't fit in the tropics

Wind Chill											
Wind Velocity (km/h)	Measured Air Temperature (°C)										
	0	5	0	-5	-10	-15	-20	-25	-30	-35	-40
	5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47
	10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51
	15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54
	20	1	-5	-12	-18	-24	-31	-37	-43	-49	-56
	25	1	-6	-12	-19	-25	-32	-38	-45	-51	-57
	30	0	-7	-13	-20	-26	-33	-39	-46	-52	-59
	35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60
	40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61
	45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62
	50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63
55	-2	-9	-15	-22	-29	-36	-43	-50	-57	-63	
60	-2	-9	-16	-23	-30	-37	-43	-50	-57	-64	
65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	
70	-2	-9	-16	-23	-30	-37	-44	-51	-59	-66	
75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	
80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	
Travel can be dangerous							Frostbite within 30 minutes		Frostbite within 5 minutes		
Use heated vehicles, temporary shelters are unsuitable and dangerous.							Frostbite within 10 minutes				
					Start of the danger of frostbite and possible death.						

The main concern in the tropics is wet clothing and wind removing body heat faster than a survivor can replace it.







# Hypothermia

## Warning

Hypothermia can occur gradually. Since it affects your thinking, you may NOT realize it is happening until it is too late. You must be **aware** and **alert** to the danger. Use the table below.

The key is knowing the inner body temperature. If you do not have a rectal thermometer, you **MUST** know and recognize the symptoms to assess dangers of hypothermia.

Water Temp	Exhaustion	Survival Time
Over 26.6C / 80F	Indefinite	Indefinite
21.1-26.6C / 70-80F	3-12 hrs	3 hrs-Indefinite
15.5-21.1C / 60-70F	2-7 hrs	2-40 hrs
10-15.5C / 50-60F	1-2 hrs	1-6 hrs
4.4-10C / 40-50F	30-60 min	1-3 hrs
0.27-4.4C / 32.5-40F	15-30 min	30-90 min
0.27C / 32.5F	Under 15 min	Under 15-45 min

Most hypothermia tables apply to people totally immersed in water. Disaster survivors on land are subject to wet clothing and winds that can reduce their body temperature to hypothermic conditions.





# Hypothermia

Depending on a your condition after surviving, you may have a few hours to half a day to secure shelter before you are exhausted.

**Preparing ahead of time makes all the difference.**

- Have shelter materials, tools ready and know a safe place ahead of time (and have a Plan B).
- Have adequate food, water to sustain you for physical activity levels

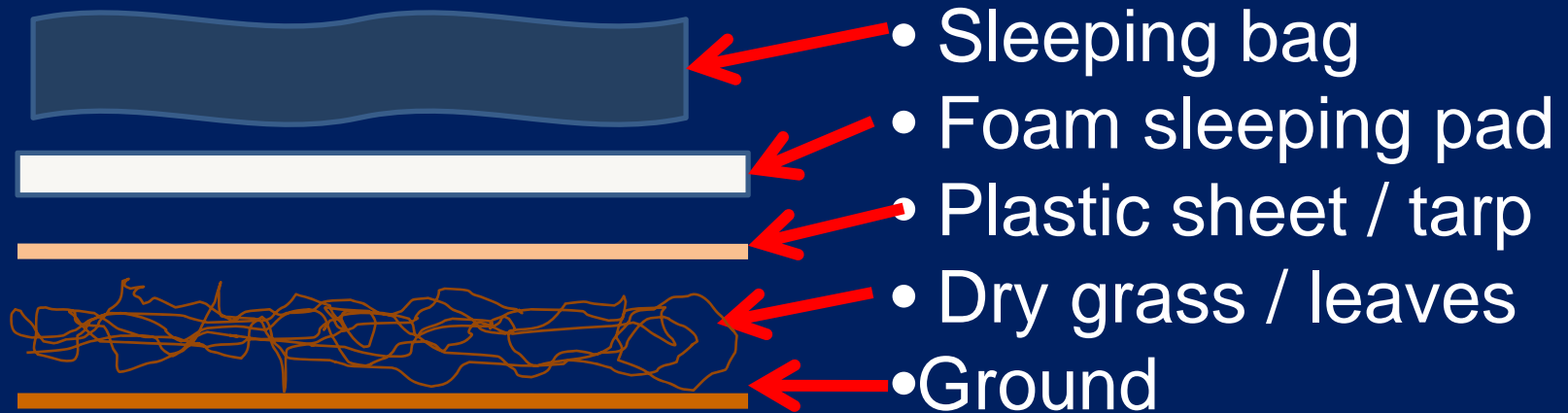
Shelter to keep you dry and out of the wind is critical to your survival. This makes it a high priority in emergency preparedness.





# Warmth in Cold Conditions

During colder conditions, it is important to insulate yourself from the ground (especially if it is wet).



Put these layers of materials between you and the ground. This will reduce the amount of your body heat being transferred to the ground.







# Shelter: Protection from Weather

Your emergency shelter plans should cover you for an emergency in seasonal variations of your area.

For example, shade is more important in the hot/dry season. But in the warm/wet season, protection from wind and rain are more important.





# Heat Stress

Disaster conditions put you at risk for heat illness.

## The Prime Risk Factors

- High temperature and high humidity, direct sun exposure with little wind
- Low liquid intake
- Heavy physical labor







# Heat Stress

Personal age and health are also important.

## The Prime Risk Factors

- The very young (infants) and the very old
- Pre-existing illness (e.g. respiratory, cardiac, etc.)
- Pregnancy





# Heat Stress

## 2 Broad categories of Heat Illness

### Symptoms of Heat Exhaustion

- Headache, dizziness, or fainting
- Weakness, wet skin
- Irritability or confusion
- Thirst, nausea, or vomiting

### Symptoms of Heat Stroke

- Confusion, unclear thinking, passing out, seizure (fits)
- May stop sweating

#### REMEDY

- Get out of the sun; find/make shade; use an umbrella or broad brim hat.
- Get cool; use water mist and hand fan
- Drink plenty of water (0.5 L / 1 pint per hour)
- Wear loose fitting, light colored clothes







# Heat Stress

## Learn how to use the Heat Stress Index

You need to know the air temperature and relative humidity to use this table. You may not have equipment to do this if you did not prepare in advance.

Heat Stress Index (Sensible Temperature)									
Air Temp	Relative Humidity								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
46°C	44°C	49°C	57°C	66°C					
43°C	41°C	44°C	51°C	58°C	56°C				
41°C	38°C	41°C	45°C	51°C	57°C	65°C			
38°C	35°C	37°C	40°C	43°C	49°C	56°C	62°C		
35°C	32°C	34°C	36°C	38°C	42°C	46°C	51°C	58°C	
32°C	29°C	31°C	32°C	34°C	36°C	38°C	41°C	45°C	50°C
29°C	27°C	28°C	29°C	30°C	31°C	32°C	34°C	36°C	36°C
27°C	24°C	25°C	26°C	26°C	27°C	28°C	29°C	30°C	31°C
Danger Level	I Caution		II Extreme Caution		III Danger		IV Extreme Danger		---
Heat Index	27-32°C		32-40°C		40-54°C		Above 54°C		Relative humidity rarely observed
Heat Syndrome	Fatigue possible with prolonged exposure and/or physical activity		Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity		Sunstroke, heat cramps, or heat exhaustion likely; heat stroke possible with prolonged exposure and/or physical activity		Heat / sunstroke highly likely with continued exposure		Generally not applicable but conditions would be extremely dangerous
<ul style="list-style-type: none"><li>• Use a hygrometer placed in a shaded position about 1.2 m / 5 ft above the ground.</li><li>• Air Temperature is read from the Dry Bulb Thermometer.</li><li>• Relative Humidity is calculated using the Relative Humidity Table. This requires the following data: Air Temperature and the Temperature Difference between the Dry and Wet Bulb readings.</li></ul>									





# Cooling in Warm Conditions

Air circulation is important for keeping cool when conditions feel warm. Sleeping in a hammock is cooler.

A hammock lets air circulate all around you to help keep you cooler.



A tarp makes shade to help keep you cooler.





# Cooling in Warm Conditions

Sleep under a mosquito net rather than in a tent for more air circulation. In case of rain, put up a tarp.

A mosquito net lets air circulate over you to help keep you cooler.



Set up your mosquito net in shade to help keep cooler

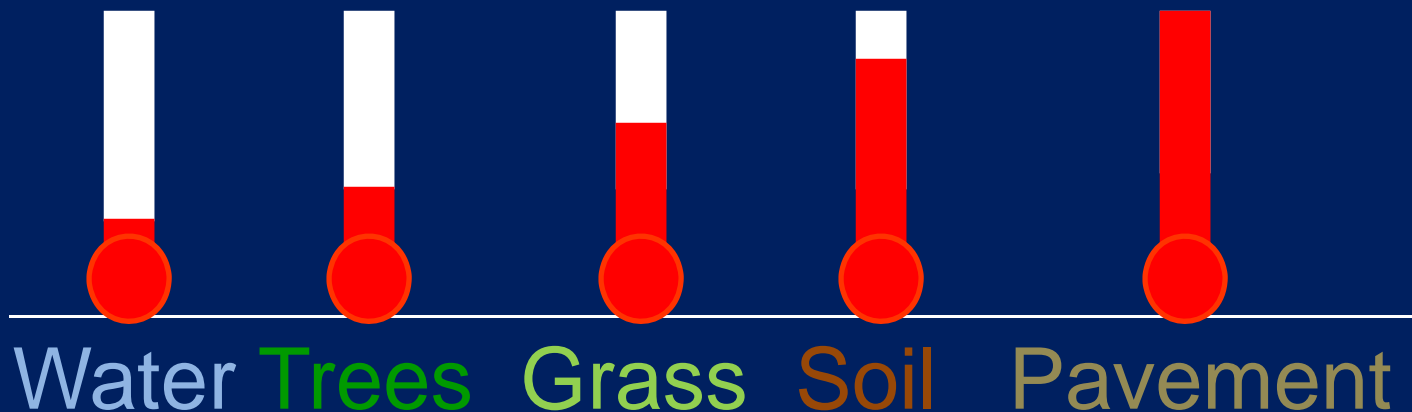


Photo from the Internet; educational fair use clause



# Cooling in Warm Conditions

Keep away from pavement, damaged buildings, and bare soil areas.



Only for  
boats

**Good**

**Try to avoid**

Different surface materials re-radiate differently.  
Here is a relative comparison / contrast of  
commonly found surface types.







# Shade: Full vs. Partial

Solid materials give full shade; netting can give partial shade. But even partial shade can reduce the temperature  $5.55^{\circ}\text{C}$ .



Full shade under an opaque roof



Partial shade under a wood trellis



Partial shade under shade cloth (open netting)





# Shelter: Tents / Tarps / Tools

You may also need some tools and rope in order to set up your shelter.







# Safe Drinking Water is Vital

Be sure to study Lesson EP-11 **BEFORE** setting up a camp, toilets, and cooking areas,



Photo from the Internet; educational use clause



# Shelter Considerations



Shelter in a disaster is different than camping. A minimum of 3.5 sq m of covered space per person is a good guide.

Covered space is needed for:

- Protection of the weather
- Sleeping / privacy / dressing
- Cooking
- Eating
- Caring for young, elderly or injured
- Sitting / meeting / socializing
- Working

A good combination is a tent with a tarp for a shaded outdoor space.







# Tents: Features/Considerations



- Waterproof floor attached to tent extending up the sides; sealed seams to prevent leaks
- Frame (possible freestanding capability)
- Fine mesh bug screening
- Rain fly (removable)



Practice using your tent to make sure you know how to set it up **BEFORE** an emergency occurs.



Photo from the Internet; educational fair use clause





# Tents: Parts and Set up



- Ground tarp (goes under tent floor; added protection for bottom of the tent)
- Rain / shade tarp (goes over tent; keep off top of tent to keep tent cooler; added rain protection)
- Rope / stakes (for tent and shade tarp)

Have a large plastic bag to keep shoes outside tent but protected from rain / dew.



Photo from the Internet; educational fair use clause





# Tents: Set up Considerations



Photos from the Internet; educational fair use clause

- Level area (maximum 4% slope; free from flooding)
- Consider wind direction for good ventilation
- Be upslope and upwind of latrines and trash pits.
- Stay 75m away from helicopter landing zones / pads.
- Stay away from overhead obstructions that may fall (e.g. power lines, towers, trees, etc.)
- Avoid ridge lines and exposed areas to lightning and high winds
- Not under a tree (rain / dew drops fall from tree to tent; lightning strike hazard, falling branches in high winds).



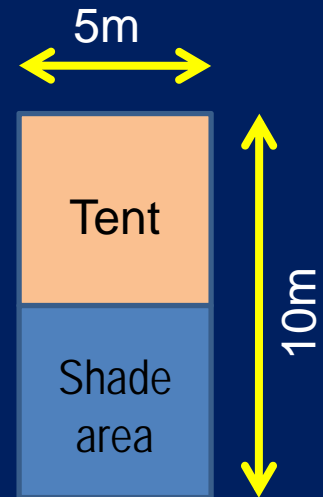


# Tents: Set up Considerations



## General layout & spacing:

- Total of about 50 sq m / 6 people / tent
- Tent pad is ~ 5m x 5m
- 20-30 cm spacing between tent plots
- 3 m pathway between tent plot rows
- 2 toilets (minimum) / 15 tent plots
- maximum slope 4%
- surface: grass or sand preferred
- avoid natural drainage flow paths



Adjust spacing/layout to fit conditions of the site. Plan ahead. Try to avoid overcrowding as much as possible due to sanitation limits.







# Suggested Spacing

General layout:

- Tent pad is ~ 5m x 5m; open tarp area is ~5m x 5m
- 20-30 cm spacing between tent plots
- 3 m pathway between tent plot rows
- area should be fairly level (max 4% slope)

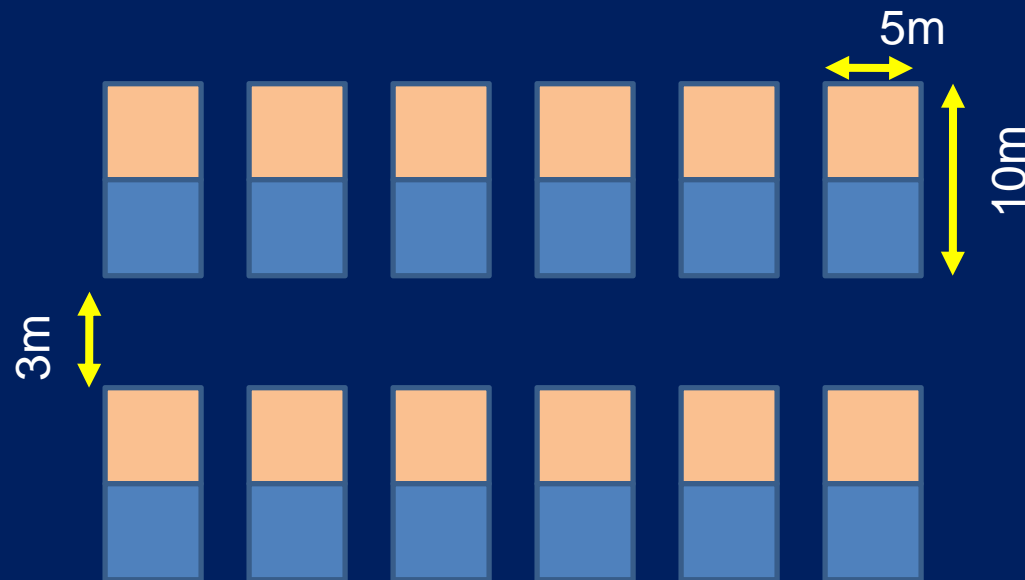


Diagram is not to scale.

Sanitation is a critical concern to limit the spread of disease.  
Avoid overcrowding by scouting out more than 1 “safe” site.





# Tents: Set up Considerations



Location of tent	To Camp feature
90 m upslope and upwind	Latrines and trash pits
75 m away from...	Helicopter landing zone
70 m away and out of drainages paths	Water sources
30 cm on each side; 3 m between rows	Other tents
Keep away from buildings by 2 X height of building	buildings, poles, towers, power lines, trees in earthquake areas
10 m away and upwind from	Fire (for heat or cooking)
10 m away from top edge of a slope, gully, ridge...	in fire prone areas (fire/heat rises moving upslope)



When setting up radio operations, arrange antennas and guy wires to minimize RF exposure and tripping hazards for survivors.



# Tents: Set up Orientation



Rain and water should drain away from your tent or shelter.

It is hottest in mid-afternoon; think about the sun angle when planning your need for shade.





# Tents: Set up Orientation



- Prevailing wind blows across door
- Avoid door facing east or west (direct sun in morning and evening)
- If ground not level, your head (when sleeping) should be upslope.
- If tent has windows, think about cross ventilation for inside comfort.
- Avoid low lying areas and water / air drainage paths when setting up your tent or shelter.







# Tent Fire Safety



- Do not use candles or anything with an open flame inside or near the tent.
- No smoking in tents.
- Do not make a fire near the tent.
- Do not set a tent up next to or downwind from a fire.
- Do not store flammable fuels in tents (e.g. gas cylinders for stoves, etc.)
- No cooking inside enclosed tents (esp. small tents). Cooking under a canopy (tent roof but no walls) is OK.





# Shelter: Fire



Fires may be the main way for survivors to cook food and keep warm. Wood may be available, but starting the fire may be difficult.



Photos from the Internet; educational fair use clause



Fire making is covered in Lesson EP-4





# Fire Starting



Have a fire starting kit:

- Ignition source: matches, lighters, magnifying glass, flint/steel, magnesium bar
- Tinder: fine material to burn (steel wool, fluffy seed heads, etc)
- Kindling: small twigs and branches
- Fuel: wood, charcoal, liquid / gas for stoves, alcohol gel hand sanitizer / sterno





# Make a Shelter with a Tarp

If you don't have a tent, tarps with rope and bamboo poles can be used to make shelter. But you need to have tools.







# Shelter: Make a Lean To

A lean to is a simple shelter to make with a tarp, some rope, and tree branches.





# Shelter: Make a Lean To

A simple tarp shelter can provide protection from the sun and rain.







# Cut Bamboo Poles / Stakes

Bamboo is readily available in most places.  
Cut poles to suit the tarps you have.



Local people are familiar and very clever at  
making use of bamboo.





# Cut Bamboo Poles / Stakes

Here is a simple shelter. Using a tarp shaped as a shallow pan for the floor to help keep the shelter floor dry







# Shelter: Bedding and Nets

Bedding can be sleeping bags/pads, blankets, a hammock. And don't forget mosquito nets!





# Shelter: Clothing

Pick clothes that can be mixed and matched to be used in all seasons. Lighter clothing in multiple layers can be as warm as a heavier, bulkier jacket.



A large plastic trash bag can be an emergency raincoat and an effective wind breaker. Just cut holes for your head and arms.







# Shelter: The Versatile Umbrella

- An umbrella is very versatile as portable shelter. It can be used for:
- rainy or sunny conditions
  - as a windbreak when cooking
  - as a privacy screen where there are no enclosed toilets
  - as a defensive weapon





# Shelter: Sanitation



This includes basic toiletries and special needs for infants, elderly, and infirm.



Learn more about sanitation in Lesson EP-11.





# Shelter: First Aid/Medicines



Every family should have a basic first aid kit. Prescription medications may be critical for people undergoing treatment.



Photos from the Internet; educational fair use clause



Learn more about first aid kits in Lesson EP-11.



# Remember: You are responsible for your safety and survival in a disaster.



Take action today:

- Make an Emergency Plan
- Prepare your Emergency Kits
- Encourage others to prepare



Once a disaster strikes, it is too late to try to prepare!



# The next lesson in the Emergency Preparedness Series is EP-3 Water



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EP-3

# Rural Training Center-Thailand RTC-TH

is dedicated to  
providing  
community-based  
environmental  
education for the self-sufficiency  
and sustainability of small rural  
family farms





# Free Self-Study Materials by Internet

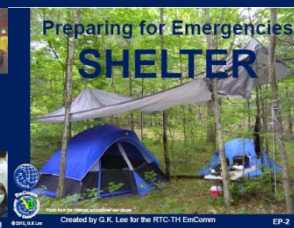
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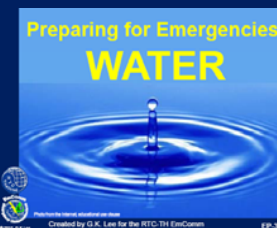
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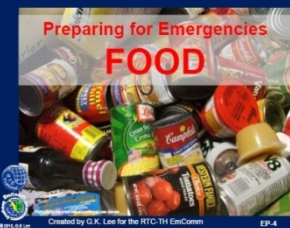
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EP-2



EP-3



EP-4



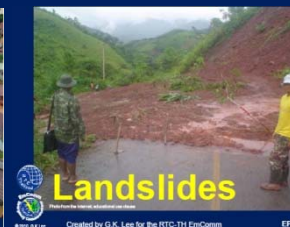
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EP-10



EP-11



EP-12



# Questions or Comments

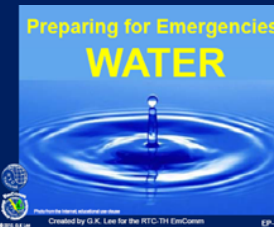
We are  
always trying  
to improve  
our lessons.  
Your  
comments  
and  
suggestions  
are  
welcomed.



EP-1



EP-2



EP-3



EP-4



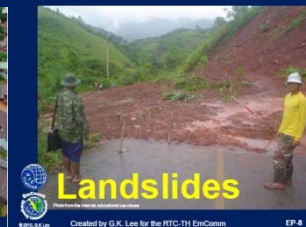
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EP-7



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EP-9



EP-10



EP-11



EP-12



You may contact us by e-mail:  
[rtc2k5@gmail.com](mailto:rtc2k5@gmail.com)



# For Emergency Preparedness Training



**Contact**  
**Greg, HSØZHM**  
Lesson Author / Mentor



Via E-mail / video chat  
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Via Skype video  
conference call: [rtc\\_th](#)

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# Future RTC-TH Emergency Preparedness Lessons

- Identifying local Geo-Hazards
- Finding safe evacuation / shelter sites
- Identifying main supply routes and alternate routes
- Finding Helicopter Landing Zones
- Helicopter landing zone hand signals
- Ground to air communication without radios



# Community-based Environmental Education for



## The End

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