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GLOBAL WARMING AND ISLAND-SINKING

by Jenolyn Hartman, J-Ritz Jack, Nellie G. Kiteuo, and Scholastica Patis

Do we really have a future in Micronesia? If we do, then it will be a tragedy caused by global warming. Sure, global warming means that the world's atmosphere is getting warmer because of the increased amount of carbon dioxide in the air. One effect is that sea-levels will rise, and so islands will sink. That is our future, and there is nothing we can do to stop it.

Island-sinking in Micronesia will be the death of low islands. We have lots of atolls in Yap, Chuuk, and Marshalls. Sometime during this 21st century, the sea-levels will rise several inches, but this amount of sea-level rising will drown our atolls. The tragedy is that sea-level rising and island-sinking have already begun, especially in the Marshalls and in the Lower Mortlocks. Beaches are disappearing, land areas are shrinking, and taro patches are drowning. A few years ago the United Nations released a report written by its Intergovernmental Panel on Climate Change (IPCC). This report was written and approved by hundreds of international scientists. It said that, if global warming could be stopped right now, island-sinking will continue for the next 300 years! In effect, there is no stopping of island-sinking, according to IPCC.

We can always blame big industrialized countries such as America and China. However, finger-pointing will not solve the problem. After all, we have to blame ourselves in Micronesia as well. Why? Because our cars use gasoline (fossil fuel), and the car fumes (smoke) contain carbon dioxide. Because our power plant (Sako) also uses fossil fuels to produce electricity for us on Weno. Because we burn our family trash, and the smoke contains carbon dioxide. In Chuuk, we are also causing global warming, sea-level rising, and island-sinking. So, just as we are the victims of global warming caused by bigger nations, we are also victims of our own actions.

Part of our future tragedy is that our ancestors did their best to take care of our islands. Now, if they were alive, they would cry to see how our island lifestyle will end in our generation. We should be ashamed of ourselves. We can blame no one but ourselves.

There are two kinds of solutions. The first one is temporary. We can ride cars less and walk more. We can use less electricity. Unfortunately, this kind of solution will delay, but not stop, island-sinking a little bit. The second solution is permanent, and it is called migration. It is simple and permanent — leave Chuuk! Again, we repeat, our islands

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GLOBAL WARMING AND ISLAND-SINKING

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will sink no matter how hard we try to prevent it. On a world map today, our islands look like tiny dots. On a future map, even the dots will disappear.

Our SS 150 instructor painted a gloomy future for us. Taro patches will die because of salt-water intrusion. Breadfruit trees will die too. So, as our instructor said, maybe we should learn how to cook and eat mangrove leaves.

The four of us share one piece of advice to our fellow Chuukese. Start planning and packing to leave Chuuk. Migration is the only real solution. That is the tragedy which we are talking about. ϕ

Future Chuuk food?

HOW DOES AN ISLAND SINK?

by Valerio Manuel and Arison Osy

Island-sinking — a new vocabulary word for us Micronesians to learn. Yes, but how does an island sink? It is not at all like throwing a stone into the sea and watching it sink. As far as the two of us are concerned, our islands (especially the atolls) will sink for two reasons. The first is shoreline erosion, and the second is salt-water intrusion.

Before we understand these two reasons, let us review what happens with global warming. Because of two much carbon dioxide (CO_2) in the air, the atmospheric temperature rises. In other words, the atmosphere heats up. Warm air circulates around the globe, and so snow and ice at the North Pole and on land melt. The melted water goes into the sea, and sea levels rise. So, sea-level rising is the real problem of island-sinking.

So, first, sea-level rising means that high tides get higher. Over time, the high tides wash away the shoreline beaches. When the beaches start to wash away, that is called "shoreline erosion". It has already begun in Micronesia. Ask anyone from Moch in the Mortlocks. That atoll island has lost some of its beaches due to shoreline erosion, and seawalls have crumbled away. Coconut trees along the eroded beaches fell into the sea.

We found two interesting Internet pictures, as shown below. They show shoreline erosion in America, comparing 1999 and 2004. Sorry, we could not find pictures of shoreline erosion on Moch.

Second, sea-level rising also means that sea water soaks the land, especially on atolls, like a sponge. The sea water enters the island's Ghyben-Herzberg freshwater lens under ground. The lens supplies the taro patch and shallow wells with fresh water. However, as the sea water mixes with the fresh water in the lens, the taro patch and wells slowly fill up with brackish water. This is

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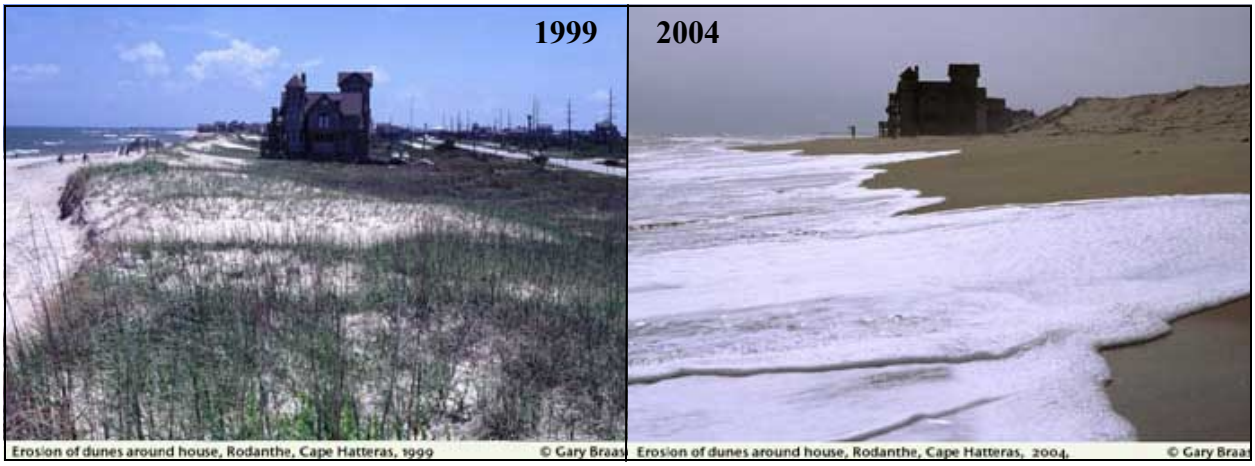

HOW DOES AN ISLAND SINK?

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called "salt-water intrusion". An example of this problem occurred several years ago on Kuttu in the Mortlocks. Salt-water intruded, from the underground, into the taro patch, and taro began to dry up and die. Ask anyone from Kuttu about this problem, and you will understand how salt-water intrusion destroys a taro patch on a low island.

A few years ago our own Campus Dean Kind Kanto wrote a report to the University of Guam. He described both shoreline erosion and salt-water intrusion in one sentence: *"Global warming will definitely affect the size of the [island] ecosystems by increasing aquatic and decreasing terrestrial."*

Moch and Kuttu are islands where island-sinking has already begun, and the problem is not going away.

What are some effects of island-sinking on an island's staple food crops? It takes 3-5 years for taro to grow and harvest. Banana plants take 2 years to bear fruit. The seasonable breadfruit trees will die, and they will not regenerate. It does not matter whether our islanders have money to buy imported food, such as rice and bread. We can still live and survive, but we will have to say, *"Good-by, local food!"*

Okay, now let us imagine solutions: relocate taro patches to upland, elevate taro patches using hydroponic systems, plant salt-water tolerant varieties of taro, establish local-food processing companies, desalinate salt water, build more seawalls that will crumble later, build houses on stilts, or evacuate those low islands and migrate to high islands like Weno — or buy one-way airline tickets to places outside of Micronesia.

For the sake of further discussion, let us talk about migrating to Weno. We found two maps of Weno, as shown on page 4. The maps came from Mr. Kanto's report. The first map is Weno today. The second map is Weno in the future. The future Weno is much smaller because it too will be sinking. By definition, "island-sinking" means that any island, including a high island like Weno, will sink too. Weno's shorelines will be underwater, and people living along the shorelines will have to move inland and upland. Which parts of future Weno will be underwater? Here are some places:

- Chuuk International Airport will be underwater.
- Seletiw, Fais, Sefin, Mwan, Neauo, and Southfield will be underwater. All of the P.I.I. roads in these areas will be underwater as well. And, of course, the taro patches from Fais to Sefin will be gone.
- Pou Bay will be huge.
- Wichon River will be underwater.
- Sapuk Village will be flooded.
- Epinup and Wichap will lose all their lowlands.

As far as we are concerned, outer-island migration to high-island Weno will not be an easy or comfortable solution at all.

Global warming is a man-made problem. People on earth caused this problem, and we struggle today to find solutions. Countries like the United States are technologically advanced, and they can surely find solutions. Countries like the FSM are going to need assistance from the United States, and I hope that this help will come sooner rather than later. We do not have much time left. ϕ

GLOBAL WARMING & EL NIÑO

by Johnston Smith

Drought! This is a word which reminds many Chuukese of a time of suffering. It happened in our recent past, and it will happen again. Why? Because it is an effect of global warming, and global warming is getting worse.

Ask older Chuukese about 1997-1998 when a terrible drought hit Chuuk and other parts of Micronesia. The real name of the drought is El Niño. It began in late 1997 and ended during the summer of 1998. It lasted several long months, and there was very, very little rainfall. Without fresh rain water the people of Chuuk were thirsty. Worse, without rainfall, taro patches became dry, and the staple crop died. The main taro patches on Weno — from Fais to Sefin — burned. Mountain sides on a few islands in the Chuuk Lagoon caught on fire. People like Johnson Elimo and Joannes Berdon told us how the Chuukese people experienced huge suffering.

The Chuuk Weather Station reports that another drought will happen in Chuuk soon. We do not know if it will be worse than the 1997-

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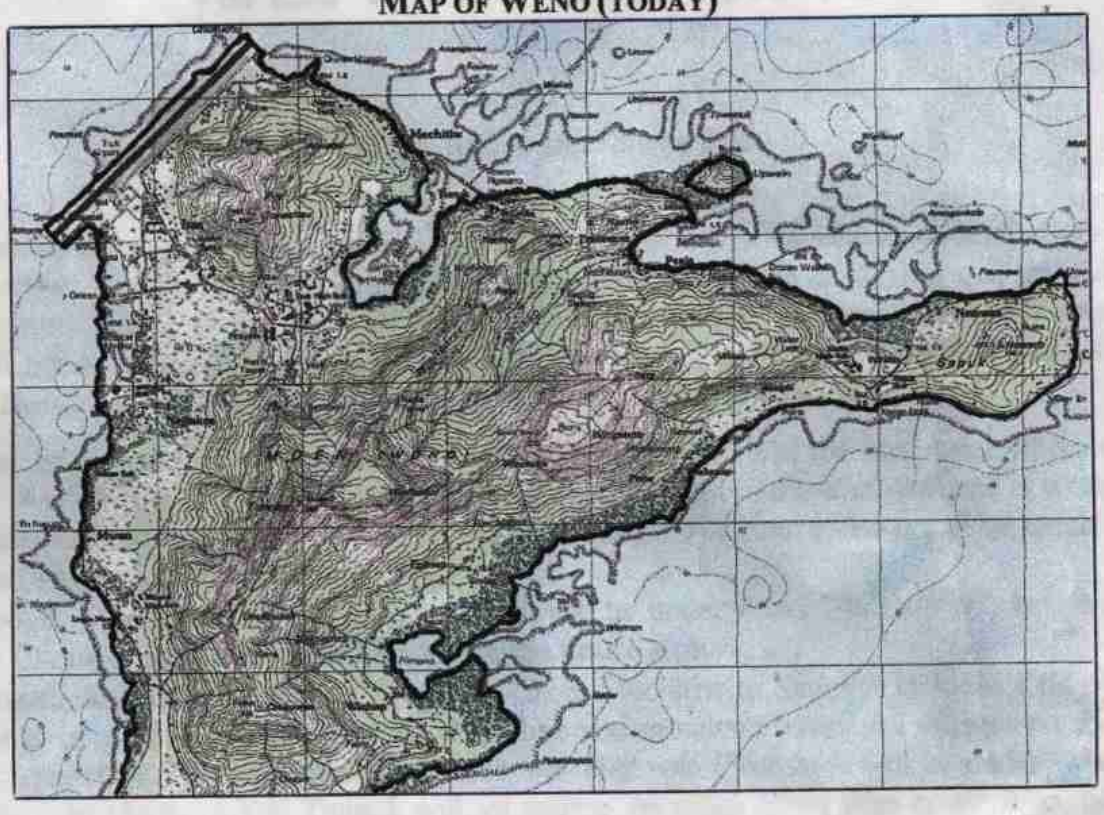
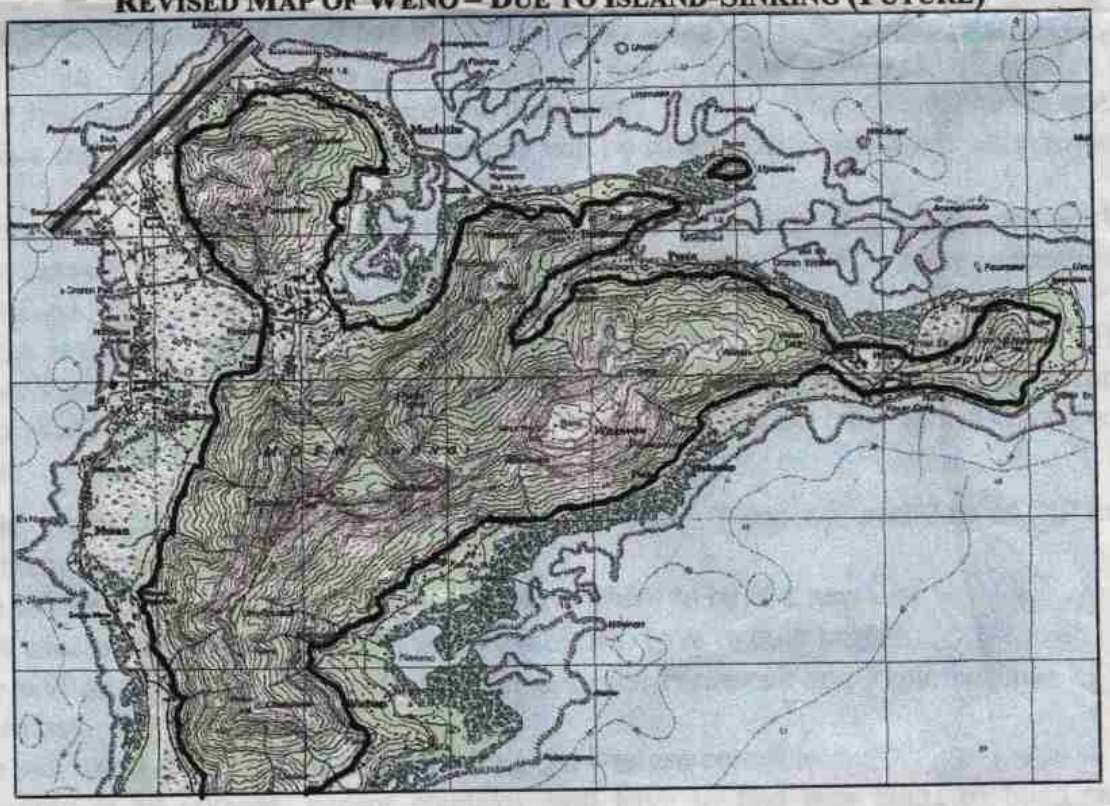
MAP OF WENO (TODAY)



REVISED MAP OF WENO – DUE TO ISLAND-SINKING (FUTURE)



GLOBAL WARMING: DID YOU KNOW . . . .

by Alton Higashi

- Five out of 200 nations produce 58% of all man-made carbon dioxide (CO_2) in the world's atmosphere? They are China 26%, United States 18%, India 5%, Russia 5%, and Japan 4%. These are industrialized countries which burn fossil fuels in their factories. They produce a lot of smoke!
  [Source: The World Almanac 2013]
- El Niño, an effect of global warming, is actually two weather conditions? They are drought and flooding. El Niño occurs in the tropical zones around the world. Droughts happen in places such as Micronesia, the Philippines, and Indonesia. Flooding takes place in areas such as China, India, and Peru.
  [Source: Internet Wikipedia]
- Modern-day global warming — caused by burning of fossil fuels — is only 200 years old? Before the year 1800, global warming was small and minor. Then, as more countries became industrialized and began using fossil fuels, the problem became global — that is why it is called "**global**" warming.
  [Source: Internet Wikipedia]
- Tuvalu — a small, independent nation composed of only 9 atolls in the Pacific — is experiencing the worst kind of island-sinking? Look at the picture (right). Every day there are two high tides, and the picture shows a typical, daily high tide.
  [Photo credit excerpted from Kind Kanto's report to the University of Guam]
  [Source: The World Almanac 2013]

- Earth is not the only place with fresh water in our solar system? There are five moons with fresh water — three of Jupiter's moons (Ganymede, Callisto, and Europa) and two of Saturn's moons (Enceladus and Titan). Earth scientists have sent rockets and satellites to study these sources of water (both solid and liquid). If scientists can figure out how to extract water from these moons, we will have enough water for Earth's people for thousands of years. Let's send a Chuukese astronaut to these moons to bring back water, so that we will not suffer during our future El Niño droughts.
  [Source: National Geographic Magazine, April 2010]

GLOBAL WARMING AND EL NIÑO

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1998 one, but we have to get ready for that unknown future.

One small solution is called "solar water desalination", and it is already being used in some of our Northwest Islands. A desalination machine changes salt water to fresh water. How does it work? We put salt water into the machine, and, under sunlight, the salt water evaporates. The machine collects the evaporated fresh water and separates it from the salt. In one day it can produce more than four gallons of pure distilled fresh water. Four gallons may not seem like a lot, but it is better than no fresh water at all.

Moreover, the separated salt is valuable. We can use it to salt fish. We enjoy eating salted fish, but it makes us thirsty, and so we need to drink more and more fresh water. Maybe we can produce salted fish and export it to other places in the world. That would be economic development for us.

I see the El Niño drought as something which we cannot avoid in the future. So, we have to think — use the desalination machine, have some fresh water to drink, and get into economic development by making salted fish. That is called killing two birds with one stone. ϕ

LET'S TALK MIGRATION

by Genevieve Liwis, Linnia Ruben, and Teinin Sam

We hear from classmates that a solution to the problem of global warming, especially on our low islands or atolls, is to migrate. After all, when our islands begin to sink, we will have to move off those islands. So, at the very least, migration will make us feel safe. That is true; however, will our migration cause other or different kinds of problems? Let's talk about this future situation.

There are two kinds of migration. The first one is called "**internal**" migration — to move from one island to another in Chuuk. For instance, outer-islanders in the Mortlocks or Northwest region can migrate to high islands in the Chuuk Lagoon, such as Tonoas, Fefen, or Tolensom. The second one is called "**international**" migration — to move from Chuuk to places outside of the FSM, such as Guam, Hawaii, California, or Oregon. Both kinds of migration are already common.

First, internal migration. The solution is simple — maybe. Outer islanders should marry Chuuk Lagooners. Outer-island women can marry Chuuk Lagoon men, or outer-island men can marry Chuuk Lagoon women. Take your pick, but we hope that such marriages will be filled with love, kindness, and happiness.

Second, international migration. If two Chuukese get married in Chuuk, make sure that your babies are born in America, so that they can become automatic U.S. citizens and cannot be deported back to the sunken islands of Micronesia. Or, if you want, you can marry American citizens, and you will not get deported. Right? Right! Just remember one thing — do not get divorced in America!

Now, be aware that living in America is not so easy. Yes, it may be easy to find jobs and to receive health, education, and welfare benefits for yourselves and your future children. But there are new problems. Men — do not get drunk or take drugs or fight — because there are already too many Chuukese guys in Guam's and Hawaii's prisons. Besides, you will have to know better English and act more American and less Chuukese.

So, what kind of migration will you accept in your future lives — internal or international? Ladies and gentlemen, good luck! ϕ

GLOBAL FLOODING: WILL IT HAPPEN AGAIN?

by Alton Higashi

Some Mortlockese people — maybe only a few — claim that there will be no sea-level rising and island-sinking — at least not in the Mortlocks. They make this claim on the basis of God's covenant with Noah. In effect, these Mortlockese equate island-sinking with flooding. With all due respect to religious belief, I say that their claim is wrong.

We learn from the Holy Bible (Genesis 6-9) the story of Noah and the Ark as well as "The Great Flood". More specifically, according to the King James Version, God's purpose was *"to destroy all flesh*" and *"every thing that is in the earth"* (Genesis 6:17). Obviously, God was upset with mankind, except Noah and his family, and explained that *"every living substance that I have made will I destroy from off the face of the earth*" (Genesis 7:4). Then, after the flood had receded, God told Noah, *"I will not again curse the ground any more for man's sake"* and *"neither will I again smite any more every thing living, as I have done"* (Genesis 8:21). Finally, God promised that there would never again be global flooding, as demonstrated by His "token of the covenant" — the rainbow — and as stated: *"neither shall there any more be a flood to destroy the earth"* (Genesis 9:11) and *"the waters shall no more become a flood to destroy all flesh*" (Genesis 9:15).

My evidence for saying that the Mortlockese claim is wrong comes from the Bible itself, as cited above. First, there have been hundreds of floods on earth, but they have all been isolated and scattered incidents. For instance, in August 1931, the waters of the Huang He River in China overflowed its

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MY PERSONAL PHILOSOPHY by Aprilyn Lukas

Name of Philosophy = **DECISION-MAKING**

Every individual makes decisions daily. Some are easy to make, others are difficult to make. Still others are truly problematic. Here is an easy one – Should I brush my teeth? Here is a hard one – Should I get married to my boyfriend? Here is a problematic one – Should I help my enemy? Regardless, everyone makes decisions, because we choose to do one thing or another. The choice can be good or bad, right or wrong. A person must therefore know what is proper and appropriate to choose.

Metaphysics

■ Anthropology
■ Theology

The Nature of Man is to live the best life possible. He is faced with so many choices. Something must guide him, and so he must use his best judgment to decide. He therefore seeks truth and wisdom from all available sources – the four sources of knowledge below.

Epistemology (Sources of Knowledge)

■ Empiricism
■ Logic and Reasoning
■ Intuition
■ Undisputed Authority

Saint Thomas Aquinas has taught each one of us to cross the bridge between anthropology and theology. The four sources of knowledge are all equally vital. To turn a blind eye on one side is short-sighted, and the only way to make the best decisions possible is to explore all options.

Sometimes the mind, body, and soul do not agree. This disagreement within Man blocks decision-making. That is why Søren Kierkegaard advised us to take that "leap of faith". An excellent example of "leap of faith" comes from the Holy Bible – I Kings 3:16-28. King Solomon, the son of David and Bathsheba, made a decision to divide an infant in half, so that two disputing women could each have half the child. His decision revealed the truth and demonstrated his wisdom. In other words, Solomon trusted in God to guide his decision-making that day three thousand years ago.

Axiology

■ Ethics
□ Aesthetics

The path to moral truth and human wisdom directs our footsteps toward decision-making. There are five steps:

(1) The first step is to identify the choices available – this one, or that one, or which one. Do not at all rush to any conclusion that one choice is automatically better than other choices.

(2) The second step is to identify the alternatives, good and bad, for each choice or option. Be as empirically objective (anthropological) and morally subjective (theological) as possible. Remember that this step requires taking Aquinas' advice to cross the bridge between empiricism and logic and reasoning, on the one hand, and intuition and undisputed authority, on the other hand.

(3) The third step is to weigh the alternatives. Here, there may be conflict between what the mind says and what the body wants. When conflict arises between mind and body, let the soul judge the consequences. Too often we think that the mind is always good and right and that the body is always bad and wrong. This is not true. The mind can be both good and bad, and likewise the body can be both good and bad. In this conflict between mind and body, the soul defines morality in the way we think (mental) and the way we act (physical).

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My Personal Philosophy: Decision-Making — *(continued from page 7)*

(4) The fourth step is to choose the best alternative. Here, intuition plays an important role. With your mind's eye, pretend that you are rehearsing the action. See the consequences of your action, and take full responsibility for your choice and your decision.

(5) The final step is to make the decision and take appropriate action. Just remember that you are held responsible for your own action and whatever consequences befall you.

When we make good decisions, the consequences will be reward. When we make bad decisions, the consequences will be punishment. The choice is up to you.

Value Systems

(1) choice and morality
(2) reward and punishment

GLOBAL FLOODING: WILL IT HAPPEN AGAIN?

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banks and killed 3,700,000 people. China is not the entire world, and, at that time (1931) there were about 2,000,000,000 people living on earth. So, about 0.2% (less than 1%) of the world's population died in the Huang He River flood. In other words, after "The Great Flood" no other flood in world history has destroyed all mankind at any one time. Mankind, in its totality, has not been wiped "off the face of the earth".

Second, island-sinking is not at all a case of flooding. In Noah's time, God destroyed the earth — all places. Every piece of land was underwater. It took God 40 days to flood the entire world. That was super-fast. Sea-level rising, however, has taken many years to increase only one inch; therefore, island-sinking will take many years for an island to sink just one inch. Unfortunately, there is no stopping of island-sinking, inch by inch, for the next 300 years. And, besides, most of the high islands in the Chuuk Lagoon will not experience disastrous island-sinking — the Mortlockese however, will experience the disaster.

No, the Mortlocks will experience no flooding, but those low-lying islands will experience island-sinking. So, yes, let us accept God's promise not to flood the world again. It will not happen. Unfortunately, God did not promise to prevent island-sinking in the Mortlocks. ϕ