



Trey Psaut
Cambodia's Irrawaddy Dolphin

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This paper is formatted as a pamphlet of information provide by the WWF to a teacher in a new Irrawaddy Dolphin Protection Outreach Program in Cambodia. Although the WWF has similar programs in Cambodia working with the preservation of the Irrawaddy Dolphins, this specific program has been invented for the purposes of this paper. The program is designed to facilitate education of rural fishermen, farmers, and dolphin-watching tour leaders along the banks of the Mekong River. The key principal in this strategy of education is that educated local Cambodians are the ones to teach the lessons to the villagers. This strategy is designed to promote the spread of education regarding environmental issues among Cambodians by setting the precedent that Cambodians can and do take charge regarding the issues faced by their country, and that they themselves must be the ones to initiate and achieve change.

WWF

**Irrawaddy Dolphin Protection Outreach
Program: Cambodia**

**Teaching Manual
2007**

Table of Contents

▪ Notes to the Instructor

▫ Program goals.....	1
▫ Biology of the Irrawaddy Dolphin.....	1
▫ A declining population.....	2
▫ Current issues with government-lead conservation efforts.....	6
▫ Importance of local impact.....	8

▪ Lesson Content

▫ Lesson One: Why we must protect Cambodia’s dolphins.....	9
▫ Lesson Two: How you can help protect the dolphins.....	10
▫ Lesson Three: How helping the dolphins will benefit us all.....	13

▪ Endnotes.....	15
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▪ Bibliography.....	17
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Notes to the Instructor

Program goals

This program is designed to promote awareness about the future of the Irrawaddy Dolphins among the inhabitants of Cambodia's rural fishing villages. Through education that focuses on changes to be enacted in the villager's daily lives that do not detract from current sources of income or subsistence, this program seeks to create practices that will be perpetuated in future generations and spread to other villages. Or khune churan heouy ning somnang lo-arh! (Thank you very much and good luck!)

Biology of the Irrawaddy Dolphin

The Irrawaddy River Dolphin, *Orcaella brevirostris*, known as *trey psaut* in the Cambodian language of Khmer, is a small, freshwater dolphin found in Indonesia, the Philippines, Myanmar, India, Thailand, and the Mekong delta of Laos, Vietnam, and Cambodia. The Irrawaddy Dolphin is characterized by a short beak, bulging head, broad, triangular pectoral fins, and a small dorsal fin set far along the back. The skin of the dolphins varies from slate-blue to slate-grey with a lighter undersideⁱ.

The Irrawaddy Dolphin is found in shallow tropical waters, usually estuaries. The entire species is endangered; however, numbers within subpopulations that live strictly in freshwater, such as the Cambodian dolphins of the Mekong River, are the lowest. Freshwater-dwelling populations tend to favor deep pools and mangrove forestsⁱⁱ. The diet of the Irrawaddy Dolphins consists mainly of crustaceans and boney fish, particularly catfish and carp, as well as various species of small fishⁱⁱⁱ. Solitary individuals are rarely seen. Groups of dolphins usually range in number from two to ten. Although not much

definitive information is known regarding their social structures, it is probable that the Irrawaddy Dolphin has a complex social network with in groups^{iv}.

The oldest recorded Irrawaddy Dolphins, all of which were found dead in fishing nets, were twenty eight years old. As several individuals of this age have been found, all entangled in nets, (likely indicating a premature death,) it is believed that the Irrawaddy Dolphin can live into its thirties. Due to small population size and subsequent difficulty in tracking the species, no further information is known regarding the dolphins' average lifespan. The Irrawaddy Dolphin reaches adult length between the ages of three and five years. This rapid growth-rate is believed to correspond with an equally rapid attainment of sexual maturity^v.

A declining population

All estimates regarding the numbers of Irrawaddy Dolphins are tentative. Their environment, murky lake, river, and estuary waters, and wide range of territory make them difficult to count. Their sensitivity to interference removes the option of tagging. Until 2005, the Irrawaddy Dolphin was believed to be found in South and Southeast Asia, and Australia. The total population, including data from both continents, was estimated at two thousand individuals. In 2005, biologist Isabel Beasley identified the Australian population of dolphins as belonging to a separate species: that of the previously unidentified snubfin dolphin. As the Australian population of snubfin dolphins consists of around one thousand individuals, their identification as a separate species reduced the number of Irrawaddy Dolphins by half^{vi}. Current estimates regarding the numbers of Irrawaddy Dolphins in Cambodia's portion the Mekong River range from sixty seven^{vii} to one hundred^{viii}.

The decline of the Irrawaddy Dolphin population in Cambodia began in 1975 with the onset of the Khmer Rouge. Before the Khmer Rouge, estimates of the population of Irrawaddy Dolphins in Cambodia averaged around one thousand. By 1979, at the end of the Khmer Rouge, the dolphin population was estimated to have fallen below one hundred. During the four years of the Khmer Rouge, Khmer Rouge soldiers decimated the dolphin population, shooting them for target practice and ruthlessly hunting them for their oil, which was used to grease weapons and as fuel to run motor boats. Apart from the reduction of the population to roughly seven percent of its pre-1975 size, the Khmer Rouge drastically diminished the range of the dolphins. Before the Khmer Rouge, Irrawaddy Dolphins were known to live not only in the Mekong River, but also in Cambodia's other major water system: the Tonle Sap River and Tonle Sap Lake. Since the Khmer Rouge, no Irrawaddy Dolphins have been seen in Cambodia outside the Mekong River^{ix}.

Today, Cambodia's Irrawaddy Dolphin population continues to struggle against extinction. Since the Khmer Rouge, the number of dolphins has made no recovery due to problems created by the fishing practices employed along the Mekong River, the high levels of toxins present in the water because of pesticide use, habitat destruction from gold mining, live capture for use in shows, and the increasing number of dolphin-watching tourist boats^x.

Dolphin-watching tourist boats pose a great threat to the Irrawaddy Dolphins of Cambodia. The drivers of these boats frequently attempt to come far too close to the dolphins, hoping for larger tips from their passengers. This often results in the boat literally chasing a group of dolphins, causing great stress to the animals and occasional

death when a boat strikes a dolphin. No regulations currently exist for the management of these dolphin-watching tours^{xi}.

Another crucial problem facing Cambodia's Irrawaddy Dolphin population is the threat of live capture. Thailand in particular is guilty of taking dolphins from the Mekong River for use in shows and aquariums. At least eight recorded cases of live capture of dolphins in Cambodia reveal Cambodian villagers to have performed the actual capture of the animal. In these instances, the Cambodians involved were paid for their services by Thais who had requested the captures in order to sell the dolphins to aquariums^{xii}.

Despite its high mortality rate during capture and in captivity, the Irrawaddy Dolphin is considered an ideal exhibit due to its naturally friendly, playful nature. As the Irrawaddy Dolphin is drawn to humans and naturally performs "tricks" such as spitting water, fin slapping, and emitting above-water vocalizations, it is considered ideal for aquarium shows because it requires little training. Although the capture of dolphins was outlawed in Cambodia in 2000, the problem of black-market capture still persists^{xiii}.

Next to improper fishing practices, the greatest threat to Mekong River Irrawaddy Dolphins is that of habitat destruction due to agricultural pesticide use and dredging, used in the gold mining process. Dredging disrupts the Irrawaddy Dolphins' sanctuaries of deep pools. These pools, particularly crucial during the dry-season when river levels fall drastically, are dramatically filled with sediments when dredging occurs. This reduces their depth and subsequently, their usefulness to the dolphins^{xiv}.

Toxins from pesticides used in agriculture are the other large factor in the habitat destruction faced by the Irrawaddy Dolphins. Another major cause of death among Cambodia's dolphin population is poisoning caused by pesticide runoff. In one WWF

study, dolphin deaths in the Mekong River were recorded from August of 2004 to January of 2005. In this five month period, ten dolphins were discovered to have died due to pesticide poisoning. Of these ten deaths, eight were babies under one year of age^{xv}. Studies from Vietnam in 1999 demonstrate that, in Vietnam (where farming practices are extremely similar to farming practices in Cambodia,) farmers often applied pesticides and herbicides to their crops up to ten times in a single growing season. The recommended number of applications of pesticides is two times per growing season. As pesticide use is significantly higher during the rainy season than in the dry season, the intensity of pesticide use even far from the Mekong River greatly impacts the river's water quality as flooding carries runoff far from its point of origin and into the river^{xvi}.

The single greatest threat to the survival of the Irrawaddy Dolphins of Cambodia is the use of improper fishing practices. Most dolphin deaths occur due to entanglement, and subsequent drowning, in gillnets. This threat is greatest during the dry season, (December through the end of May,) when the dolphins take refuge in the deep pools favored by fishermen for their large numbers of fish^{xvii}. The recorded number of dolphin deaths due to entanglement in nets, (which is significantly lower than the actual number of deaths by entanglement,) averages around four per year. Assuming the estimate of seventy Cambodian Irrawaddy Dolphins accurate, four deaths by entanglement would annually claim nearly six percent of the population. As it is probable that the recorded by-catch of dolphins is less than half the actual number, the annual percent of the population killed by entanglement is likely closer to twelve or thirteen percent^{xviii}.

Other forms of inappropriate fishing in the Mekong contribute to the deaths of the Irrawaddy Dolphins. Dynamite fishing creates noise pollution that disorients and stresses

dolphins, and is occasionally lethal. Dolphins are occasionally struck with dynamite and consequently die^{xix}. Electric fishing occasionally results in the electrocution of dolphins^{xx}. Over fishing remains a large threat to the Irrawaddy Dolphin as well. Gillnets with fine mesh stretched across a narrow channel capture fish so effectively that dolphins, up or down stream, cease to have access to food. Dynamite and electric fishing can also eliminate nearly all fish in a deep pool. During the dry season when dolphins remain in such pools for months at a time, such decimation of a food source, even only in a restricted region, can result in starvation^{xxi}.

Current issues with government-lead conservation efforts

Cambodia's governmental involvement in the protection of the Irrawaddy Dolphins has been inconsistent. Although the Cambodian government has created several laws providing varying forms of protection to the Irrawaddy Dolphins, insufficient actions are taken in regards to the public notification and the enforcement of these laws. An example of this problem is found in the conflicting illegality of live capture of dolphins and the continued prevalence of the practice. The most startling element of this conflict is that the majority of the dolphins are sent to Thailand after their capture. This indicates that there is not only insufficient enforcement of the law against the practice of live capture, but also an appalling lack of border control or a general willingness to alter regulations in return for bribes^{xxii}.

A second shortcoming of the Cambodian government in regards to the preservation of the Irrawaddy Dolphin is the lack of honesty with which the environmental status of the Mekong River is reported. The *2005 Biodiversity Report* from the Mekong River Commission consists of an ecology lesson regarding what

biodiversity is, what species of fish live in the Mekong River, and what some threats to biodiversity *could be*, yet fails to reference a single specific threat to biodiversity that is actually occurring along the Mekong^{xxiii}. The Mekong River Commission's *2005 Annual Report*, which relates the status of projects along the Mekong, provides some information regarding ecological threats to the river, yet fails entirely to mention the endangered Irrawaddy Dolphins. (Annual reports from 1992 through 2004 also were absent of a single reference to the dolphins.) In the *2005 Annual Report*, environmental, agricultural, and fisheries programs were laid out, however, these programs showed no marked difference from programs presented in the 2003 and 2004 reports^{xxiv}.

While the government of Cambodia does support the presence of educational programs lead by organizations such as the WWF, no effort by the government has been made to create a Cambodian-run program to promote awareness regarding the preservation of the Irrawaddy Dolphins. Cambodia's rural areas, including those along the sections of the Mekong River where the dolphin populations exist, are exceptionally isolated from governmental contact. Ignorance regarding consequences created by the lack of communication of the dangers of inappropriate fishing practices, pesticide application, and live capture are much greater components in the perpetuation of these practices among the Cambodian people than apathy or purposeful destruction of the dolphin population.

Importance of local impact

Native Cambodians have a rich tradition of cooperation with and folklore about the Irrawaddy Dolphins. Many consider it extremely bad luck to even accidentally kill a dolphin, yet have received no input regarding alternate practices that would allow them to

fish or farm without risking the death of dolphins^{xxv}. Cambodians have an ancient story regarding the origin of the Irrawaddy Dolphin. It is said that there was once a beautiful young woman gathering fruit along the banks of the Mekong River. As she made her way home, an enormous, magical python followed her. Realizing her danger, the young woman began to run. Unable to escape, she threw herself into the rushing waters of the river. Rather than drowning or being crushed against the rocks, the woman was changed into a mermaid-like dolphin with human eyes, a wide smile, and an enchanting, mystical voice. It is said that this is why the Irrawaddy Dolphin is so friendly towards people, and why in turn, the dolphins are so alluring to humans^{xxvi}. This story has inspired centuries of cooperation and respect with the Irrawaddy Dolphins from Cambodians. Today, that relationship is in danger due to recent changes in technology without the increased education that such advances demand. It is crucial that the local Cambodians living along the Mekong River are educated about measures they can take to prevent the habitat destruction and accidental killings of Irrawaddy Dolphins.

Simple changes in daily practices can be made that will in no way negatively impact the Cambodian villagers' subsistence or profits. The three most critical areas of necessary simple change are local fishing practices, pesticide and herbicide use, and management of dolphin-watching tourism. In each of these areas, alterations can be made that do not undermine the potential monetary gains of the parties involved, yet greatly benefit the safety of the dolphins.

Local leadership and responsibility in enacting these changes is imperative because of the trend toward lack of government involvement and because locally lead alterations in practice tend to be better received and are more likely to become

interwoven into tradition. Locally lead initiatives are also more inclined to place responsibility for the future in the hands of the villagers in most direct contact with the issue; in this case, the fishermen, farmers, and tour guides. When these demographics receive the needed education to assume this responsibility, they are able to spread that education to others as opposed to if they were simply to receive penalties from law enforcement for failing to follow laws of which they were ignorant, which is a typical manner of governmental control in Cambodia.

Lesson Content¹

Mei Rien Mouy: Heit ovey pouk yeurng trao té tob sk-art trey psaut robos srok Khmer

(Lesson One: Why we must protect Cambodia's dolphins)

Cambodia is a beautiful land, rich with resources and a spectacular variety of habitats and species. One of the most significant of these species, with which we have always shared a special bond, is the *trey psaut* (Irrawaddy Dolphin). Our stories tell us that the *trey psaut* is one of our own kind, transformed into the shape in which she now hides. It is our traditional duty to do all that we can to protect her and her daughters.

For generations, our fishermen have heard stories and seen with their own eyes the help and luck that the *trey psaut* bring them in their work. The *trey psaut* will swim around the boat of a fisherman, driving schools of fish into his nets, or slap its fins on the water, stunning the fish for the fisherman to scoop from the surface^{xxvii}. Clearly this animal is a treasure that we must seek to protect.

In many of your lifetimes, you have witnessed the once large population of the beautiful *trey psaut* fall from over one thousand to less than one hundred. The War that

¹ These lessons are designed to be presented from the perspective of one Cambodian teaching other Cambodians. All references to “we” and “us” are therefore referring to the Khmer people.

hurt us and our families was not restricted to human injury. During the four years of The War, the loss of *trey psaut* began. Today, without knowing, we have continued to contribute to the loss of our *pouk mark kgnon tonle* (friends in the river.)

By accident, our fishing nets entangle the friendly *trey psaut* as they chase the fish we hunt. Our dynamite thrown into the river to stun the fish confuses, frightens, and often kills the young or weak *trey psaut*. Electric shocking of fish electrocutes them, while the tour boats we bring too close can strike and kill them. The pesticides we apply to crops wash from our fields into the rivers during the floods of the rainy season, poisoning the *trey psaut*.

Because there are such small numbers of *trey psaut* left in the Mekong River, even one preventable death is cause for concern. Today, it is likely that ten to twelve *trey psaut* die every year from drowning in fishing nets, eight to ten are poisoned by pesticides, and two to four are killed by tourist boats^{xxviii}. Most of these deaths, (around three quarters,) are baby *trey psaut*, under two years of age^{xxix}. This is particularly concerning because it means that very few babies are surviving to sexual maturity, and are therefore not producing babies themselves. The number of preventable deaths of *trey psaut* per year is between twenty and twenty six. As the total population is only around sixty seven, this means that every year, between thirty and thirty eight percent of the population is dieing from preventable caused. If this problem is not quickly dealt with, the numbers of our *trey psaut* will continue to fall, soon reaching the level of extinction.

Mei Rien Pee: Yang mich nak chouy tob sk-art trey psaut
(Lesson Two: How you can help protect the dolphins)

There are many things we do in our daily lives that seem simple and ordinary to us. We stretch gillnets across sections of the river, stun fish with dynamite and electric

shocks, treat our crops with pesticides several times in a growing season under the heavily pouring rain, and agree to the requests of eager tourists to drive our boats just a bit closer to the *trey psaut*. All of these actions have become so ordinary to us that most of us do not realize the ways in which they are harming our environment, and our fellow animals.

When tour boats approach the friendly, curious *trey psaut*, they often strike and kill them with out the driver even noticing. The motivation for approaching the *trey psaut* is often the promise of a greater tip from the tourists. In a country such as ours where a single tip often surpasses the entire day's set pay, it is not surprising that such a motivation would be difficult to resist. However, if the *trey psaut* no longer live in our river, there will be no tourist coming to see them at all. The best way to bridge the gap between what the tourists want and what is safe for the dolphins is to stop your boat, turn off the motor, and wait for the inquisitive *trey psaut* to come to investigate.

The use of pesticides in farming is often necessary. Cambodia's climate and abundance of plants is ideal for harboring insects that will devour your crops. This struggle against insects often motivates you to apply pesticides to crops as many as ten times per growing season. This creates danger not only for you, the farmer, but for surrounding villagers, and for the inhabitants of the river. During heavy rains, pesticides that have collected throughout the year are washed into the rivers in the flood waters, poisoning the *trey psaut*. These pesticides can also harm you and others who come into contact with them. Exposure to chemicals can cause infertility, birth defects, cancer, lung and brain damage, and skin and eye conditions. It is not necessary that you stop applying pesticides, however, their use should be limited to two times per growing season. Apart

from the protection this provides you, your family, and our river, this will save you money. The pesticides you use are expensive, and are only intended for one or two uses per season. When applied three or more times, they have no more effect than when used twice. If pesticides are used as directed, you will save money, protect yourself and the *trey psaut*, and your crop yields will be no lower.

Despite the ancient bond they share, the greatest danger to our *trey psaut* comes from fishermen. Recently, gillnets began to replace scoop-nets and dynamite and electric shock fishing became more popular. All three of these modern fishing methods are very dangerous to *trey psaut*. It is difficult to entirely stop these practices. Fish is one of the most important sources of food for us, and its sale a key source of income. Modern fishing methods do increase the catches we make and there are ways to maintain some new methods while still protecting our *trey psaut*.

The most dangerous fishing practice to the *trey psaut* is the use of gillnets^{xxx}, yet gillnets are also the most valuable tool for our fishermen. They allow us to harvest large numbers of fish in a short time, and can simply be set out and left^{xxxi}. Gillnets are so dangerous to the *trey psaut* because they are very difficult to see underwater, and when stretched all the way across a channel, impossible to avoid. While chasing fish, *trey psaut* often swim directly into the nets, becoming so entangled under the water that they cannot surface to breathe. This is the problem that causes the largest number of *trey psaut* deaths.

No one expects you to stop using gillnets. It is understood that they are as necessary for your survival and the survival of your families as they are dangerous to the *trey psaut*. Instead, there are changes you can make in the way you use a gillnet. Tying

reflective objects, such as tin cans, foil wrappers, and scrap metal to the nets makes them easier to see and avoid by the clever *trey psaut*. Another easy way to make a gillnet less dangerous is to stretch it less than halfway across the channel of the river. This leaves enough room for several *trey psaut* to swim past.

The most important alteration to make in the way a gillnet is used is the most potentially difficult. When *trey psaut* die in a gillnet, they die by drowning. If a gillnet is left unattended, *trey psaut* that become tangled in it will have no way to escape. However, if someone is present, watching the nets, able to raise an alarm if one is entangled, there is a good chance that you will be able to release it. Once people are aware that a *trey psaut* is trapped in a net, they can lift it to the surface every thirty seconds, allowing it to take a breath as they work to detangle it^{xxxii}. The difficulty of this system comes from the fact that someone must always be there to watch the net. This can be a problem for anyone who either has multiple nets to tend, or who uses their time between laying out nets to farm or do other forms of work. The best solution to this is to have children or others who are not working watch the nets. This strategy works well as it does not take anyone from their work and, if children are tending the nets, passes down the importance of protecting the *trey psaut*.

Dynamite and electric fishing are more difficult to do safely. The sound of the explosions of dynamite, which confuses and stuns the *trey psaut*, can travel very far under water, as can the electricity released through shock-fishing. There is really no way to be sure that *trey psaut* are not near by when these methods are used. The best thing you can do is to only use these methods when you absolutely have to. Avoid using them

in or near deep pools during the dry season particularly, as this is where *trey psaut* spend their time in this season.

Apart from using these safe practices yourself, the most important thing you can do is to share this information with others in your village and in surrounding villages. The more of us that know about the ways to protect our *trey psaut*, the safer they will be. None of us wish to harm our beautiful friends, many of us believe that causing their death, even by accident, is among the worst things that can be done. If we use the information we have, share it with others, and always try to learn more, we can make the needed changes to be sure that we will always have our beautiful *trey psaut*.

Mei Rien Bhei: Yang mich chouy trey psaut ning chouy pouk yeurng tang ors
(Lesson Three: How helping the dolphins will benefit us all)

One of the best things about protecting our *trey psaut* is that, apart from the natural benefit of the continuation of the species, we will receive personal rewards for our work. Some of these benefits will come from the survival of the *trey psaut*, while some are the direct result of the measures we take in order to protect them.

One of the most important things we can do to protect our *trey psaut* is to reduce the number of times we apply pesticides to our crops. This will protect the *trey psaut* by improving water quality in the Mekong River. At the same time, this change will also improve our own health. Exposure to pesticides should be limited as much as possible. If we apply pesticides twice instead of five times per season, we will be protecting ourselves and our families who also come into contact with the poisons. The overall water quality of the Mekong will improve, raising fish populations and making it safer for us to drink, bath in, and wash our clothes with. There is also the immediate benefit of using less pesticide: the cost of farming is lower^{xxxiii}.

A second benefit of protecting the *trey psaut* in any way is that, as their numbers rise, the ancient cooperation between them and the fishermen will increase. Because there will be more *trey psaut*, they will work even more with you to chase fish into your nets, hoping for the small reward of a fish or two that is always granted. Fishermen who have had the help of a *trey psaut* are always sure that their catches are larger than at any other time^{xxxiv}.

Another reward that will result from the recovery of the numbers of *trey psaut* is the benefit of the tourism that the larger population will be able to support. Today, there are not enough *trey psaut* for large numbers of tour boats, but, with their numbers increased, tourism will become a huge industry for you to become involved in. Tourism will bring a great deal of money to your villages. As the numbers of *trey psaut* go up and tourism grows, it is always important to remember that tourism can be dangerous to the *trey psaut*. It is best to always allow them to approach the boat, never safe to chase them, and vital that tourists do not attempt to touch them. If these things can be remembered, the relationship between you, tourists, and the *trey psaut* can be one of the best ways to protect them and to support your families.

The most important benefit of the protection of our *trey psaut* comes from the continued existence of one of our most special and ancient friendships. As can be seen in the carvings of the Bayon Temple at Angkor Watt, we have shared a bond with the *trey psaut* since our earliest cultural memories. Like the temples, the beautiful open rice fields, and the northern hills, the *trey psaut* are a part of our land, just as we are. Since the beginning of our relationship with them, we have found a connection with the *trey psaut*. They have helped us in our fishing, delighted our children, supplied our

imaginings, and recently brought money to our pockets through their draw to foreigners. It is now our turn to protect and aid them.

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Immediately after receiving her PHD in marine mammal studies, Isabel Beasley founded the Mekong Dolphin Conservation Project in Cambodia, then went on to discover the Snubfin dolphin in Australia. Her article outlines the biology, behavior, and range of the Irrawaddy dolphins. She makes specific reference to the behavior of the dolphins during Cambodia's dry season, a time when they are at greatest risk of entanglement in fishermen's nets. This information relates directly to the development of strategies to be implemented by fishermen to prevent dolphins from becoming entangled during this particularly dangerous period of time.

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Pesticide Use in Paddy Production in the Mekong Delta, Vietnam. Singapore:

Tanglin Co., 1999 (Suzzallo/Allen WA240.N576e 1999.)

This book examines the consequences of the use of pesticides in rice farming on the people and environment of the Mekong. Although this book discusses pesticide use in Vietnam as opposed to Cambodia, the pesticides used and the quantities and methods of application employed are nearly identical to those in Cambodia. The importance of this book for my research pertains to the environmental consequences of the pesticide use, and the suggested alternative and improved farming techniques. These alternatives and improvements are particularly important because the people living along the Mekong would be more likely to change their routines if a feasible alternative was presented along with the information about the negative impact of their current practices.

Kamm, Henry. *Cambodia: Report from a Stricken Land*. New York: Arcade Publishing, 1999.

Macan-Markar, Marwaan. 2005. Environment: New Deaths Highlight Threats to Irrawaddy Dolphins. http://www.newsmekong.org/environment_new_deaths_highlight_threats_to_irrawaddy_dolphins. (Accessed May 4, 2007.)

Marwaan Macan-Markar is a journalist for Inter Press Service Asia-Pacific, an online news provider funded by the Rockefeller Foundation. This article, located under the special reports on the Mekong River, describes recent deaths of Cambodian Irrawaddy dolphins and information gained through monitoring the dolphin population. The article details scientific speculation regarding the recorded deaths of the dolphins as well as hypothesis regarding their overall population reduction, and gives projections regarding the future of the species. The two most suspected causes of death outlined in this article are entanglement in fishing nets and poisoning due to runoff from gold mining and agriculture. These two causes of reduction in the dolphin's population are the two most closely related to the action of the Cambodians who live along the Mekong. As this is the focus of my research, this information is quite valuable.

Mekong River Commission. 2005. *Annual Report 2005*. Vientiane, Lao: Mekong River Commission. (Suzzallo/Allen HD 1698.M4 A5 2005.)

This report contains information regarding the ecological status of the Mekong River and programs implemented regarding the river during 2005. The three programs detailed in the report that were relevant to my research were the Environment Program, Fisheries Program, and the Agriculture, Irrigation, and Forestry Program. All three of these programs deal directly with the issues contributing to the decline of the Irrawaddy dolphin population. Although the three programs mention outreach and education, their primary focus is on a government lead approach. This is important for my research as it shows exactly what the governments of countries along the Mekong River are sharing with the people, and what is being left out. From this, I can develop my own plan of what needs to be conveyed to the people living along the Mekong in order for them to make changes that can positively impact the dolphins

Mekong River Commission. 2003. *Biodiversity and Fisheries in the Mekong River Basin*. Phnom Penh, Cambodia: Mekong River Commission. (Suzzallo/Allen SH295 B56 2003.)

This report is about the current levels of biodiversity in the Mekong River. Although it does not directly mention the Irrawaddy dolphins, the report puts a high level of emphasis on the multiple species of fish in the Mekong, which are the dolphins' food source, and on the fishing practices employed by villagers. The current inappropriate fishing practices are one of the main causes of premature death for the dolphins, therefore, the information about the current and suggested methods is crucial for my research. What is particularly important in this report is the fact that many of the suggested fishing methods, while they are more environmentally friendly in some ways, are still not all dolphin-safe. From this, I can analyze the shortcomings in the currently recommended programs and from there, learn where to put my emphasis.

Paskin-Carrison, Muriel. *Cambodian Folk Stories From the Gatiloke*. Boston: Turtle Publishing, 1987.

Smith, Brian D. March 2007. Conservation Status of Irrawaddy Dolphins. http://www.cms.int/bodies/ScC/14th_scientific_council/pdf/en/ScC14_Doc_08_Irrawaddy_dolphins_Eonly.pdf. (Accessed May 4, 2007.)

Dr. Brian Smith is a member of the United Nations Environment Program selected by the UN to supply the Convention on the Conservation of Migratory Species of Wild Animals with this report on Irrawaddy dolphins. This report requests international aid in the preservation of the dolphins. It describes the historical elements in the decline of the species and the current threats on a local and international level. The report details strategies that could be implemented on an international level, which are important for me to include in my discussion of local-level preservation efforts.

WWF. January 22, 2007. Irrawaddy Dolphin. http://www.panda.org/about_wwf/where_we_work/asia_pacific/our_solutions/greatermekong/area/species/mammals/irrawaddy/index.cfm. (Accessed May 8, 2007.)

The WWF is one of the worlds' largest and best known conservation organizations. Their website gives information about the biology, behavior, range, and status of the Irrawaddy dolphin. The site gives highly specific information regarding the situation of the Irrawaddy dolphins in Cambodia as the organization is currently involved in a project to protect and promote awareness about the dolphins. The focus of these preservation efforts is outreach to Cambodia's people. As the involvement of the Cambodians who live along the banks of the Mekong River is the focus of my research, this aspect of the site is particularly important. Links from the main article about the Irrawaddy dolphins provide information about the WWF's strategies in Cambodia, background to the problems facing the dolphins, and data and research regarding the threats to the dolphins' population.

WWF. October 2004. WWF Position Statement: Irrawaddy Dolphin. <http://assets.panda.org/downloads/ecop13irrawaddypositionpaper.pdf>. (Accessed May 4, 2007.)

The WWF is one of the worlds' largest and best known conservation organizations. This report is a request for the Irrawaddy dolphins to be moved from an Apex II to an Apex I status on the Endangered Species list based on the extreme decrease in their population. The report gives a detailed overview of the recent population trends of the dolphins, data that will be very useful in my justification for the need to implement measures to protect the dolphins. The report also gives accounts of specific instances of dolphin deaths due to entanglement in fishing gear. As alteration of fishing methods is one of my proposed primary targets for improving the safety of the dolphins, this data is also highly valuable. The report also mentions the illegal capture and trade of the Irrawaddy dolphins to be used in shows and aquariums. This is another deterrent to the dolphin population which the local Cambodians can help prevent.

Works Refrenced

Brocheux, Pierre. 1995. *The Mekong Delta: Ecology, Economy, and Revolution, 1860-1960*. Madison, Wisconsin: University of Wisconsin. (Suzzallo/Allen DS559.92 M44 B763 1995.)

This book is about the historical events along the Mekong River. As the history of the portions of the Mekong that flow through China, Laos, Vietnam, and Thailand are

recounted as well as the Cambodian parts, only specific sections of the book are relevant to my research. The sections that do apply to Cambodia are important because they give information regarding the traditional connections to and use of the river. These traditions are important to keep in mind when suggesting new treatment of the river and its surrounding areas. Another important portion of the book is the small section about the Khmer Rouge's treatment of the Mekong River. During the Khmer Rouge, the new regime dumped unusually high levels of waste and chemicals into the waters, as well as slaughtering the dolphins for meat, oil, and sport. The book only briefly touches on this period of time; however, it is excellent to have to refer to as a supplement and verification to my prior knowledge.

Holm, Mette. 2001. *Mekong River: Mother of Waters*. Phnom Penh, Cambodia: Mekong River Commission. (Suzzallo/Allen DS521.62 H65 2003.)

This book is highly significant for my research because it is as close to absolute propaganda as I could find. The fact that this book is almost pure propaganda makes it important because it demonstrates the governmental reluctance to admit to or discuss environmental problems. From this book, I can get a relative idea about what the people who live along the Mekong are told in their limited communications with the government. From this, I can pinpoint the current level of knowledge among the people, and see how much more needs to be shared.

Mekong River Commission. 1992-2004. *Annual Reports 1992-2004*. Vientiane, Lao:

Mekong River Commission. (Suzzallo/Allen HD 1698.M4 A5 1992-2004.)

Oasawa, Kaori, Kavin Li, Pianporn Deetes, and Satomi Higashi. November 2003. *Lancang-Mekong: A River of Controversy*. International Rivers Network. (Suzzallo/Allen TC513M45 L36 2003.)

This book is about the controversy over a dam recently built on the Mekong River in China. The book outlines the divergent views about the impact of the dam. Most of the concerns about the dam are about the changes in flood levels during the rainy season and recession levels during the dry season. The book deals mainly with the conflicts faced by the people who live along the river, however, the same information about the water levels can be analyzed and applied to the situation of the Irrawaddy dolphins. Water levels greatly impact the safety of the dolphins because extreme divergences in the level can cause them to be more or less likely to become entangled in fishing nets.