

Consultancy to the Mekong Wetlands Biodiversity Program

Consultant:

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Consultancy request by:

Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme

Terms of Consultancy (In brief):

An assessment of the potential for implementing silkworm farming and the production of refined silk in the Mekong Ramsar site.

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EXECUTIVE SUMMARY

MWBP is interested in the possibility of beginning a silkworm production activity in the Stung Treng region with a focus on the Ramsar Site along the Mekong River. The idea is that silk production can add income to the most vulnerable in the area and possibly help with the overall need for increased silk produced in Cambodia.

The situation at present is that more than 90% of the silk used in Cambodia weaving centers comes from Vietnam or China. It is sold thru the markets in Phnom Penh and used for both the warp and weft of all silk weaving. It is not possible in the short term (the next 5-10 years) to change this situation to the point where ALL silk can be produced locally however it is felt that a good beginning can be made to provide silk for the weft at least. Weft silk is used as “filler” in weaving therefore it is not required that this silk be of very strong quality. The strongest silk thread is used for the warp. This thread needs to be well spun to be strong enough for the warp which is under tension.

Vietnam now produces silk on an industrial basis. They have the ability to produce silk in volume at a good price. Cambodia will not be able to get to this point immediately however it is felt that a good beginning can be made if properly managed. Silk production can add to family yearly income and also provide opportunities for farmers to add other crop production to their incomes on a yearly basis.

Stung Treng is well situated along the Mekong to provide sufficient water during the dry season for the mulberry bushes. The difficulty is in getting water from the river to the mulberry plantations during the dry season. It makes little sense to provide the necessary pumps etc for mulberry plants only, however if the farmers were to use their land to grow additional crops then the finances work out in a more positive way. For example, if a farmer has 500 mulberry bushes and is producing vegetables as well, near the mulberries, he could use a water pump to water both the mulberries and the vegetables. The income generated from the vegetables could help support the fuel costs.

As stated above, Cambodia will not be able to produce all the silk required in the short term but it can concentrate on producing silk for the weft only as this silk needs not be processed in the same way as warp silk. Since the weft silk is used for the filler only, the processing is not as difficult or costly to produce. If this can be accomplished in the next several years and at a level that is sufficient for weavers in many parts of Cambodia, then a decision can be taken as to providing the warp silk as well. This would require a great deal of investment as the equipment and training requirements are costly.

Silk produced in Cambodia for weft only would allow the weavers to use labels that would properly state “made with Cambodian silk”. This would add to the value of the products produced as Khmer silk has a unique quality in its color. It is said that 100 years ago, Cambodian silk was the premier silk of S E Asia.

MWBP decided to survey the Ramsar Site area to see if it is possible to produce some silk here on a “pilot project” basis. If the communities involved are interested and sufficient quantities of silk can be produced in the near future (the next 3-5 years), then the possibility of increasing silk production in Cambodia is quite positive.

In order to do a proper assessment of the situation, a consultant was hired to visit the villages in the 4 communes in the Ramsar site area. Soil considerations were considered along with the willingness of villagers to become involved in this effort. The basic requirements are land, water and willingness on the part of the villagers to do this work. Processing of the cocoons, markets for the silk produced and support in the initial phases for this to become a reality are financial responsibilities that need support from IUCN.

Many of the requirements have been satisfied in terms of land, water, willingness of farmers to produce silk. The unknowns remain in terms of how and where the cocoons would be processed as this is a different activity from actually growing silkworms. Processing happens every 7 weeks so the processing could not be done properly by the farmers. Another group of villagers would need to be trained to do this work once the quantities of cocoons would justify this type of training.

There is currently a silk weaving center in Stung Treng that uses approximately 700 kilograms of silk annually. They are in the process of finding donors that would support a sericulture project in Stung Treng as well. Their requirements are expensive for something that is unknown in terms of results. If they are successful in their requests for funding, they could become the center for all silk cocoon processing in Stung Treng.

Based on the above, it is felt that a “pilot project” should be implemented. This can be done in a way that would not be expensive as the farmers are the key to success. If farmers can be identified in several of the communes involved and they are properly supported in the initial phases, the possibility exists that more farmers will be willing to add this activity to their sources of income.

INTRODUCTION

The purpose of this consultancy is to study the feasibility of creating a sericulture project in the Ramsar Site area of Stung Treng Province. The focus group for this study are the most vulnerable in the province. Since the main income of the villagers is rice production, it is expected that another type of farming activity could be beneficial as a secondary income during the “dry” season.

The study focused on 21 villages in 4 communes of 2 districts in Stung Treng. Total population of this area is approximately 12,000. Aside from rice farming, there is precious little other activity currently in these villages.

After an initial assessment of the villages, it was decided that “formal” meetings should be held in as many villages as possible to access the interest of local farmers in sericulture. These meetings would consist of explaining and demonstrating the various parts of sericulture. Silkworms, mulberry leaves, moths, eggs and cocoons were taken to many villages in order to give a better understanding of the processes involved.

A schedule of villages and meeting times was developed and sent to each of the villages approximately one week in advance of the meetings. The village chief was responsible to inform the villagers of the meetings and explain why. Attendance varied in villages from more than 70 people in one village to zero attendance in another.

After a brief introduction, the villagers were addressed by the consultants wife who is a native of Stung Treng and speaks Lao as well as Khmer and English. She is also very familiar with the entire process of sericulture having been involved in this work for the past several years. She took the place of a “ translator” provided by IUCN on the first day of the pre-assessment who had little English ability and also had no idea of what is involved in sericulture.

Once the formal part of the meetings was complete, villagers were invited to look closely at the eggs, worms, cocoons and silk. For many, this was merely something of interest for the moment but several persons were identified that demonstrated genuine interest. It was decided that the consultant would try to visit the land available belonging to some villagers in order to access the potential for them becoming silkworm producers.

Of the 21 villages, 17 were visited personally by the consultant and meetings held. Of the 17 meetings, approximately 5 villages were considered as having good potential for further work. It was decided that we would hold a second meeting with these “good potentials” to further discuss and decide on their interest and abilities.

The objective of all these meetings was to identify potential silkworm farmers and then take them to the consultant’s farm for a close up first hand look at the entire process. Providing as much information as possible at the beginning of the process can result in less problems as the pilot project progresses. At every stage of this process, villagers were given time to discuss with their families what would be required and the benefits of becoming involved.

The consultant has been involved in both silkworm production and weaving since 1997. For more than 10 years, the consultant has worked with an international NGO working mostly with disabled persons injured by landmines. Our mission was to provide mobility devices to these people. At the beginning, I noticed that many people are disabled in other ways as well: mainly economically. Providing the second step of the rehabilitation process seemed to make very good sense. Attempts were made to teach various individuals skills that would enable them to become truly rehabilitated in terms of their economic future. After several attempts at training programs, silk weaving was viewed as a perfect activity as it could include people with various “physical disabilities”

in various parts of the process. Silkworm production was also included in these efforts. After 7 years of work, the weaving center was privatized by an American woman currently living and weaving in Laos. She has post-graduate degrees in weaving and served as a consultant to the United Nations before setting up her own weaving center in Laos in 1989. This privatization occurred in January 2005 and continues to be successful.

In 2003, the consultant purchased land in K. Thom province. Currently we are setting up a tourist center for people traveling between Phnom Penh and Seam Reap. The location is just off the main road half way between the two points. We now have a mulberry plantation with about 400 bushes to feed silkworms and produce silk. We also have some weavers producing scarves for purchase by tourists. People can see the entire process of silkworm production and reeling silk. My experience is that most people have seen weaving but few have seen the actual process of feeding silkworms and reeling the silk.

The above details indicate that the consultant has skills necessary for this project and that success is possible with proper management and training at the local level.

Past History – Current situation

There is no silk production to be found in the province at this time although there were some efforts in this field almost 100 years ago.

During the initial phase of the assessment, several persons said “My grandmother did that a long time ago”. This remark was heard on multiple occasions. There are still a few Mulberry trees too be seen in villages. One old woman remembered helping her mother in both feeding silk worms and then her mother doing the reeling, dyeing and weaving of sarongs which were then sold in Laos.

There is one weaving center in the province (Mekong Blue) known as the Stung Treng Women’s Development Center. They employ about 25 weavers currently and have constructed a second building to train another 20 weavers. Currently they use approximately 700 kilograms of silk per year. They could be prime users of silk produced in the province. They have requested funding for a sericulture project. If they are successful, silk production in Stung Treng could become a major industry.

In Cambodia currently, silk production is less than 10% of the current demand. Most silk comes from Vietnam or China and sold through the markets in Phnom Penh. This situation needs to be corrected for several reasons:

1. Quality and quantity are not reliable.
2. Silk products from Cambodia can’t use a label saying “100% Khmer Golden Silk”.
3. Income for Cambodian families could be enhanced with good sericulture farming.

The total annual consumption of silk in Cambodia is anywhere from 85 tons (GTZ) to 400 tons (PASS) and currently less than 5 tons are produced in country. This information has been provided by PASS, a silk production project in Seam Reap. There are efforts underway in several areas of Cambodia to address this problem and increase silk production. Stung Treng is well situated for this activity since it is near the Mekong river and thus has an abundance of water available. The farmers also have lots of land available since their main source of income is rice production.

METHODOLOGY AND RESULTS

As stated above, 17 of the villages located in the Ramsar site area were visited by the consultant. After initial assessments, meetings were held in these villages with varying attendance. Once the meetings were completed and potential farmers identified, visits were made to several of the villagers land to assess the suitability of soils, water availability and interest on the part of the families.

Most of the land is situated along the Mekong however it must be noted that having water available is only one ingredient needed as it is necessary to find an efficient way of getting the water from the river to the mulberries. Pumping is the obvious answer but the cost of fuel for irrigation of mulberries only would consume a good deal of income earned from silkworm production. Some of the farmers said that if they could be provided a water pump, they would be able to irrigate other crops as well and therefore help to subsidize fuel costs. This seems a viable solution and also indicates the farmers interested in sericulture are thinking of ways to become profitable in this work.

The soils for the most part are capable of mulberry bush growth. The soil tends to be clay therefore will hold water during the dry season. A system of keeping the mulberries from drowning during the rainy season is needed. The plantations could be constructed in a similar way to a rice paddy in that water could be provided during the dry season by "flood irrigation" and then work to develop a drainage system for the rainy season. As noted above, there were several mulberry trees still growing in various villages from years past. Obviously these trees had little care and were able to survive.

Village Assessment,

Phase I, December 2005

The consultancy focused on 21 villages in 4 communes in 2 districts in Stung Treng. In order to gain some information of the current situation, time was spent doing an initial survey of the villages. During this initial phase, notes were taken as to the general condition of the various villages. For example, factors such as how many people were trying to grow vegetables, work on house repairs, selling things in the markets and other activities that indicate a willingness on the part of villagers to earn income, were taken into account. Several villages visited had a general air of inactivity, while others appeared tidier and people seemed more active. This is a good indicator for future reference regarding the criteria for selecting "target villages".

During the initial visits, some villagers were curious about our being in their villages. We tried to explain that we were doing a survey to see what interest, if any, existed on the part of the villagers towards silkworm production. They didn't understand what we were talking about and did not seem interested. It was decided that once we did the "formal" survey, silkworms, mulberry leaves, cocoons and eggs should be taken to the villages in order to gain a better understanding of the entire process.

Phase II, January 2006

Having completed the first phase of the assessment, a plan was worked out with the help of staff at IUCN in order to visit "formally" as many villages as possible. In order to assure good attendance, a letter was sent to each village informing the village of our visit; date and time. These letters were sent approximately one week prior to the visit. List of villages visited follows:

January 3 and 4: Koh Sneng Commune

Jan. 3: Koh Sneng and Koh Sralaou

Jan. 4: Chorm Thom and Koh Ky

January 5 and 6: Preah Rumkel Commune

Jan. 5: Kralapech and Krom

Jan 6: Anlong Svay and Koh Cheuteal Thom

January 9 and 10: O'Svay Commune

Jan 9: O'Svay + O'Run and Koh Phnaou

Jan 10: Vein Sean and Koh Hup

January 11 and 12: Samaki Commune

Jan 11: Khe and Kham Phan

Jan 12: Koh Korndin and Thmei

Attendance varied at each village from 0 participants to more than 70 people at another village. The average attendance was about 20-25 people with woman outnumbering men in almost every meeting. There were also many children and babies at the meetings. Total attendance in all meetings is estimated at more than 450.

When the meetings started, little interest was evident however once the eggs, cocoons etc were shown, many people gathered around. At the conclusion of each meeting, the village chief asked who would be interested in doing sericulture. Some hands were raised however it seemed not to be an actual representation of interest. The village chief was asked to record the names of interested people.

Once all the meetings were completed, it was necessary to have a meeting in Stung Treng with representatives from as many villages as possible to assess the interest in each community. The meeting was held at the IUCN offices on 28 January.

The purpose of this meeting was to inform villagers of the results of the initial survey and determine their interest in continuing with this project. People from each of the villages visited were invited to this meeting. 16 people actually came to this meeting. There were local farmers as well as some commune leaders. Both men and women participated.

Discussions focused on the processes, land required, number of family members or others needed to complete this work and the type of support anticipated from IUCN. Great emphasis was placed on making the people understand that this was to be a "pilot project" and therefore they would be responsible for most of the work. IUCN would provide support in terms of tools needed, equipment for silkworm raising, mulberry bush branches to plant and cocoons provided for the first generation once the mulberries were capable of providing enough leaf for a first generation of worms. The villagers would be responsible for providing land and getting it ready for planting. It was pointed out that they should think in terms of a small production to begin in order to assess the advantages and problems encountered and to better understand requirements for the second generation of silkworms.

At the conclusion of this meeting, 6 people were identified (two each from three communes) as willing to go to the consultant's farm in K. Thom Province to have a first hand look at the entire process. The purpose of this visit was to have a greater understanding of sericulture and determine if they would be interested to do this work in their communities. All expenses were covered by IUCN and the consultant provided sleeping areas and nets for everyone.

After the two day visit, two people wanted to have cocoons immediately in order to begin the process on their own and one woman asked for some mulberry cuttings to plant on her land. We tried to discourage this however they seemed to insist so we relented. The result was that the cocoons did in fact hatch out and produce eggs which later hatched. Unfortunately the worms died after a few days which proved to the villager that he indeed needed proper training in order to be successful. The people visiting the mulberry farm are listed below with the communes identified:

Preah Rumkel:

Mrs. Nuki, an assistant commune chief

Mrs. Ko See, the mid-wife in Koh Cheunteal Thom

O'Svay:

Mr. Mao; #2 commune chief

Mrs Lie Su

Koh Sneng:

Mr. Mai

Commune #2

Conclusion:

1. Interest remains high
2. 1 man took cocoons to begin now
3. understand work involved
4. assured they have family labor
5. each has land available with possibility to expand
6. access to water if provided with pump

IMPORTANT ISSUES:

WATER

Mulberry bushes need irrigation on a weekly basis during the dry season (Dec. to April). The rainy season is also a small problem in that provisions need to be made in advance for insuring the plants do not rot in the ground due to too much water. A system needs to be developed that will allow for proper irrigation in the dry season and sufficient water runoff in the rainy season. If the planting areas can be done in a way similar to a rice paddy, the irrigation in the dry season could be done by flooding the area on a weekly basis. Irrigation pumps for this purpose are available at reasonable prices. The problem is in the fuel costs which have been addressed to a degree above.

A Koshin pump can produce 900 liters of water per minute however this volume would not be appropriate as the force of the water would destroy the plants. If the water could be delivered to a kind of "holding area" then the farmer could use the water not only to irrigate his mulberries but also other vegetables on this land. The water could also be used in the house for toileting, cleaning and other uses such as watering livestock. This pump burns less than 1 liter of fuel per hour so the fuel costs could be quite low considering the volume of water delivered. Smaller volume pumps can also be purchased.

LAND AVAILABILITY/REQUIREMENTS

Most of the farmers in the communities surveyed have excess land that could be used for mulberries. The land clearing would be the responsibility of each farmer. They would need to clear the land and level it in such a way as to insure proper irrigation and water runoff during the rainy season. Not more than half a hectare of land should be considered at the beginning since too many bushes could easily discourage the farmer.

LABOR REQUIREMENTS

All labor would be provided by the individual farmer families. It will be necessary to have two people from each family trained in the entire process. It will also be necessary that the land be near the family house or that the families are prepared to have people live at the mulberry farm as care needs to be provided on a daily basis. It is not possible for the worms to be unattended for any lengthy period of time. The work is not taxing in terms of labor but demanding in terms of time spent at the production facility.

EXPECTED INCOMES

The first year income will be quite small as the bushes will not have matured and the kilograms of cocoons generated will be less than needed however it should be noted that this first year should be seen as a learning experience. At the conclusion of this year, an assessment needs to take place where the farmers determine if they are willing to increase their plantations and also if they believe that it is a profitable activity. Again, this will not provide all needed income for families but it can be very helpful in providing additional income.

It is expected that 125 mulberry bushes can feed worms that will generate 2.5-3 kilograms of cocoons. 2 Kilos of cocoons bring 10,000 real (\$2.5) With this in mind the following chart can be helpful:

125 bushes=3 kilos cocoons*

250 bushes=5-6 kilos cocoons*

500 bushes=11-12 kilos cocoons*

* mature bushes – after 2 years in the ground

12 kilos of cocoons per generation x's 7 generations = 84 kilos cocoons

84 kilos cocoons x \$1.25 per kilo = \$105 income per year.

Although this is not sufficient to support a family, it will certainly help. Again, the process is not too difficult during the rainy season. The only difficulties would be watering during the dry season.

84 kilos cocoons per family per year x's 3 families (initially) would produce 252 kilos cocoons. 252 kilos of cocoons x's \$1.25 per kilo = \$315 per year.

Once the first year is completed, the farmers will decide if they are willing to increase their production areas and have the land available. Full time silk worm production should be

FINANCIAL ASPECTS

Land will be provided by the individual farmer and it will be their responsibility to prepare the land for sericulture. They will need to be provided with tools for the clearing of the land and the necessary equipment for silkworms when this process begins. Tools such as axes, hoes, shovels etc. will be provided along with various trays, tables and beds for the silkworms as well as nets and water jars to place under the bed for protection from ants and other insects. It will also be necessary to provide some rain protection gear for the worms during the rainy season.

Since the first year of production will be small, housing for the silkworms etc should be provided by the individual farmers. If they decide to increase the production in year two, then IUCN should consider financing proper silkworm raising houses. This could be accomplished by IUCN providing the bricks and cement while the farmers provide the labor. The worms need to be kept out of direct sunlight and also of course protected from the rain.

The water pump will need to be provided by IUCN as well. It is not yet clear if each farmer would need his or her own pump but it is suggested that in the first year only one pump be purchased that could be used by all three farm families. Some system of insuring protection and care of this pump would need to be worked out. Since it will be needed for a period of approximately 6 months, some process needs to be provided to insure its safety and use.

RAW SILK PREPARATION

This is a "pilot project" so the silk produced this first year will be minimal. However if everything works out well, then a facility to process the silk (spinning the silk from the cocoons) will need to be provided. As mentioned above, possibly the people at Mekong Blue will be raising silk worms as well and then all cocoons could be processed at their location. Since this process happens only every 7 weeks, it is not a good idea to train individual farmers in this work. They would have little chance of becoming proficient in reeling silk.

If the reeling center could be located in Stung Treng town, then it has a very good chance of attracting tourists. Most tourists have seen people weaving so that is not something unique or special however few have ever seen the reeling process and the numbers of cocoons needed to produce one silk thread. Properly advertised, this could contribute to the overall income of people in the area.

CONCLUSIONS

A few villagers have been identified for this pilot project. We have one family in each of three different communes. They all appear to be willing and interested to do this work. They have land available, near the river, large enough for this pilot project. The soil is fine for mulberry plants with proper irrigation. All the families are now engaged in farming so this would be an additional activity that would fit well into their existing lifestyle.

If this first year pilot project is successful, then it should be possible to include more farmers in the area to become silkworm producers. As indicated, the consultancy contacted more than 400 people in the 17 villages. The selection of the first farmers to be silkworm farmers was based on their willingness. It can be expected that more people will do this work in the future if the incomes generated are sufficient. Since this is a farming activity, water requirements for other types of vegetable production could be added which would not increase costs. Once the costs of fuel were properly allocated, it is expected that these costs can be regained with more food production.

The spinning of silk from cocoons should not be done by the individual farmers as their responsibility is to produce cocoons. Again, the initial production will not be sufficient to justify training of spinners but if cocoon quantities can be produced that will justify the spinning process being done in Stung Treng, then it will be necessary to provide training and a facility for this purpose. For now, the cocoons should be purchased by IUCN and then sold on to a group that does this work in Phnom Penh. This will add to the initial costs and also the possibility of damage to the cocoons in shipping but this risk seems to be worth it for the potential future benefits to the Stung Treng community.

RECOMMENDATIONS

Based on the results of the survey, it is recommended that the pilot project begin. It should be noted that there are many strengths, weaknesses, opportunities and risks associated with this project:

STRENGTHS:

- Land available
- Near Mekong River
- Good soil conditions
- Farming is the main source of income
- Silk weaving center located in Stung Treng town
- Increasing number of tourist visits per year

WEAKNESSES:

- Workforce that is not well disciplined
- Low education levels
- No current history of silkworm production
- Land located far from houses in some cases
- Providing water to mulberries in dry season

OPPORTUNITIES:

- Increase income for many farm families
- Provide new economic activities for the province
- Increase skills for people with proper training
- Alternative income sources for farmers
- Year round income (small but continuous)

THREATS

- Hard work at the beginning for small additional incomes
- Farmers discouraged
- Expansion costs

The three families considered to begin this work are ready. They should begin clearing the land and preparing it for mulberry bush cuttings. If this can be accomplished in the next 2 months (May-June) Mulberry bush cuttings can be provided in June. The cuttings require approximately 6 weeks to take root. Once this happens, the people can come to the consultants land for silkworm production training. This process normally takes 7 weeks however with two distinct generations of silkworms no time needs be wasted in terms of waiting for the worms to produce eggs (10 days) nor another 10 day period for the eggs to hatch into small worms. This will enable the entire training process to be shortened to 5 weeks (35 days). During this training period, the trainees will be given complete responsibility for every part of the growing process from egg to egg.

They will not however be expected to do anything with the cocoons once they are completed. This responsibility should be provided by another organization. Some suggestions have been made in terms of who this could be: Mekong Blue, located in Stung Treng province or another group of people trained in the province after the first year of silk cocoon production.

TRAINING STRATGEY

1. MULBERRY BUSHES

- A. Clear land for mulberry plantation (by farmers)
- B. Provide planting directions. (booklet)
- C. Plant cuttings when rain starts
- D. Irrigation and water control during rainy season.

2. SERICULTURE

- A. Farmers to K.T. for training when plants leaf out
- B. 2 people from each family for a 5 week training session
- C. Reading and writing necessary
- D. Train with two distinct worm generations to save time
- E. Completion of training, provide cocoons to farmers
- F. Begin silkworm raising at the farms

3. FOLLOWUP

- A. Once the first generation is complete, assess the results
- B. Meeting will be in Stung Treng with all 3 farmers present
- C. Inspect the production and determine what problems exist
- D. Kilograms of cocoons produced by each farmer.
- E. Number of bushes used to feed worms
- F. Decide on next generation

PROJECTED COSTS

FINANCES:

COSTS FOR LAND PREPARATION AND PLANTING

Program	Cost
Land costs	no costs – provided by owner
Clearing land: by individual farmer	no costs – provided by owner
Training for mulberry cultivation	\$50 per day x 3 plus transport = \$250
Tools required for land preparation	\$75 x 3 = \$225
Cuttings provided for initial planting (as available)	no cost

COSTS FOR SERICULTURE TRAINING

Program	Cost
Food and housing allowances for trainees	5000 riel per day x 40 days x 6 persons = \$300
Transportation to and from training center	\$170
Produce a booklet for each farmer with complete instructions to raise worms	\$100
Provision of cocoons for first generation to be given to each family	No costs

COST FOR SILKWORM PRODUCTION AT EACH FARM

Program	Cost
Tools for maintaining mulberries (hoes, shovels, watering equipment, pruning shears and other tools as needed)	\$50 x 3 = \$150
Trays, beds, nets, water bowels, buckets etc to maintain worms	\$50 x 3 = \$150

OTHER COSTS

Program	Cost
Purchase of one water pump and hoses per farmer for irrigation in the dry season	\$400
Support for purchase of initial cocoons produced	\$100 – IUCN to purchase
Cost for training at mulberry farm in K.T. and follow up meetings	\$50 x 35 days = \$1750
Contingency fees for year 2	\$5000

**Total =
\$8595.00**

Note: An additional \$5000 should be set aside for 2007. Farmers will need cement to build water holding areas and possible cements floors for the silkworm raising house. Sand and rock are provided by the farmer as well as labour. Training costs will also need to be considered for more farmers to be trained and equipped for sericulture

FUNDING SOURCE

IUCN is prepared to fund this pilot project. If results are positive, further funds will need to be available. Cooperation with a local government agency will be necessary. The Stung Treng Department of Rural Development is suggested. This office was contacted during the consultancy to see what interest they may have in partnering with this endeavor. Some interest was indicated but possible encouragement will be needed. Perhaps they could involve themselves in the watering processes during the dry season.

TIME LINE

After the first year of silk production, an assessment will be needed. This will involve, but not be limited to, meeting with the farmers to determine their success and or problems encountered. If they are feeling successful, then it may be possible to find many more farmers to become silkworm producers. The original farmers could become trainers for all new people. This should help keep costs to a minimum.

Again, the silk will need processing in Stung Treng if possible. Assuming the quantities are sufficient, either a group of people can be trained at this time to reel the silk; Mekong Blue people could be considered for this work or the cocoons would need to be sent to another location for reeling. This last suggestion is the least desirable.

Many farmers would need to become silkworm producers to insure success. The incomes generated could be substantial with proper organization and training. The basic requirements are located in Stung Treng: available water, many farming families, sufficient land, and willingness on the part of several families to do this work.

There are of course no guarantees of success. Properly funded and managed for the first several years, this could be an excellent source of additional incomes for many farming families in Stung Treng.

APPENDIX I: SERICULTURE

The life cycle of silkworms is approximately 7 weeks egg to egg.

The cocoons for the succeeding generation are selected. Cocoons are male and female; the female is small and fat, the male long and slender. 30 – 40 cocoons (15-20 male and female) should be kept for the next generation based on number of worms desired. The cocoons will take 10 days to hatch. Once they have hatched, the silk from the cocoon is worthless as the fiber has been cut.

The eggs are white when laid and require another 10 days to mature and hatch. During this time, they change color from white to black. When the worm hatches, it is difficult to see and is also black in color. No food needs to be given to the worms the first day but the feeding process will begin on day #2. During the first 5 days, only a little food needs to be provided. The leaves need to be sliced finely and spread onto the worms. Feeding twice daily is sufficient at this time. No cleaning should be done during the first several days. The worms will again change color to white as they get bigger. Once this happens, the worm trays need cleaning daily to remove excess leaf and excrement.

The leaf consumption will increase during the next 15-20 days. The worms also will need to be moved from the trays onto beds that measure 1.5 meters x 1 meter. The legs of the beds need to be placed in water to prevent ants and other insects getting into the worms. Mosquito nets also need to be used on each bed and tray to protect the worms.

When the silk worm develops the silk gland (approximately 21 days), it will again change color to yellow indicating it is ready to begin the cocoon process. Yellow worms need to be put into branches to spin their cocoons. The worms should be taken from the beds several times daily during this period. The entire generation will cocoon in 3-4 days.

When the worms are put into the branches, they cannot be disturbed for 3-4 days. The entire process of spinning the cocoon is 72 hours. Day 5 is an ideal time to remove the cocoons from the branches. Selection of cocoons for the next generation takes place at this time. The number of cocoons selected depends of the target for the next generation. The remaining cocoons need to be placed in the sun to kill the grub. The grub will change into a worm in 10 days and if this happens, no silk can be reeled.

Once the cocoons have been collected, the work of the farmer is complete. The next step is the processing of the cocoons which can not be done by the individual farms. Since this is a very demanding process, the spinning needs to be done either at a central point or shipped to a location where spinning is done almost daily.