FINAL REPORT

REHABILITATION AND CONSERVATION THE SEAGRASS MEADOWS AT CAM HAI DONG, CAM RANH BAY, KHANH HOA PROVINCE, CENTRAL VIETNAM.

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1. INTRODUCTION:

Khanh Hoa is the coastal province in southern central Vietnam, situated between 11°45'02'' to 13°02' 10'' North latitude and from 108045'10''to 109045'06'' East longitude, the length of the coast lines about 300km.

The shallow coastal area of Khanh Hoa province is often covered by seagrass beds especially in Cam Ranh bay area where the seagrass beds have concentrated distribution with the superficies up to more than 1000 ha, there are 6 common species of seagrasses have been found there, among them *Enhalus acoroides* which has long leaves (1-2 m), dense density (40- 100 shoots/m2) and high cover (70-100%) is dominant. The seagrass ecosystem play an important role in the biodiversity, marine resources and ecological balance. Studies showed that, there were 37 species of mollusc, 13 species of crustacea, 12 species of echinoderms and 87 species of marine fish have been found (Nguyen Huu Dai et al., 2000). Valuable resources in this area were: shrimp (Penaeidae), crab (Portunidae), sea-horse (*Hippocampus kuda*), mollusc (Strombidae, Arcidae, Veneridae…), sea-urchin and sea-cucumber (*Holothuria scabra*). Among 87 fish species, 30% of which are commercial species (Siganidae, Lutianidae, Mugilidae, Serranidae, Ambassidae, Apogonidae, Sillaginidae…). The role of seagrass beds in nursery grounds in this area also had been reported . The results of study showed that, the species composition as well as the density of juvenile of shrimp, crab and fish in seagrass beds were higher (3-5 times) than those in bare substrata. Fishing in seagrass beds has become more important as a food source and livelihood for coastal people in the region.

But now, because of human activities (shrimp culture development and some destructive fishing gear and methods), seagrass distribution areas were reduced. Recent studies showed seagrass beds in Khanh Hoa were loss or reduced up to 30% of distributive areas (Nguyen Huu Dai, Pham Huu Tri, 2004). The main reasons are: extensive shrimp farming, fishing by push net or trawling, degradation of seawater quality by waste water discharged from shrimp ponds and eutrophication from small rivers. More important, by demand of food for lobster cages, destroyed fishing way by digging seagrass beds for mollusc (*Lingula* spp) is main reason of seagrass loss. The consequence of seagrass degradation and the over fishing cause the decreasing of biological resources, some valuable species reduced or disappeared .

The Institute of Oceanography has authority to conserve and restore about 50 ha of seagrasses at Cam Hai Dong, Cam Ranh Bay. This area is situated from 12°01'40'' to 12°02'10'' North latitude and from 109°11'50''to 109°12'10'' East longitude, belonging to the coastal area of Cam Hai Dong village, Cam Ranh District, about 30 km in the South of NhaTrang City. Mostly of shallow area of the coastal zone of this village is covered by seagrass beds and some mangroves occurred in supralittoral area. About 40% of seagrass distribution area of this area were loss by human activities in 5 recent years (Nguyen Huu Dai, Pham Huu Tri, 2004)

The coastal inhabitants live by gleaning marine animals from the shore. The gleaning process entails people walking over seagrass and digging and collecting the animals at low tide or by wading in water up to waist depth. The gleaning by people trampling and digging is damaging the seagrass meadows and, at the same time, depleting meadows of the animals which form part of a complex food web, the nursery ground was broken. This problem is very common in shallow coastal zone of Vietnam. This causes not only to the disturbance of habitat but also to the decreasing of marine life production and the degradation of environment. We choose this study area in Cam Hai Dong as a typical model in order to largely apply and transfer the technology of seagrass bed management to other regions.

This proposal is for the development of a management practice that will sustain the taking of the animals without loss of biodiversity and allow the seagrass meadows to spell for recovery. In particular the seagrass meadows used by these villagers will be mapped, a measurement of the yield of animals now taken and the harvest's value will be made. The meadows will be divided into areas

that will provide a livelihood yet be large enough to recover after harvesting. Some will be fallowed for recovery. The scientists are also assisting coastal inhabitants to restore seagrasses where over harvesting and unsound fishing practises have destroyed seagrass meadows.

A suitable management regime can be introduced that will allow them to harvest their food products and sustain the biodiversity of the seagrass meadows. In the long-term it is to the villagers' advantage to carry out a sustainable management plan for the seagrass bed of Cam Hai Dong, Cam Ranh bay.

2. OBJECTIVES:

The objectives of this project are to:

- Rehabilitate lost or damaged seagrasses by replanting seagrasses.
- Conserve existing seagrass meadows and their biodiversity, in particular, the conservation of sea-horse, sea-cucumber. An added bonus is conserving the habitat of animals that live outside seagrass meadows but use them as nursery or breeding areas.
- Manage seagrass beds in a sustainable fashion through community based use of coastal resources.
- Give villagers the authority to manage and sustainably exploit the biological resources in seagrass beds.
- Train and transfer, to local villagers, the technologies and methods to restore and sustainably use seagrass ecosystems.
- Help local community maintain their present livelihood without the loss of many valuable species in later years. Seagrass restoration will increase biodiversity values and villagers can be expected to take part in restoration activities, bringing the community together for planting operations. The project will bring knowledge to the people of the village and build their capacity to conserve natural resources.

3. MATERIALS AND METHODS:

3.1 Research methods:

The methods used are those outlined in “Survey Manual for Tropical Marine Resources, Seagrass Communities”, Edited by English, S, C. Wilkinson and V. Baker (ASEAN-Australia 1994) and “Seagrass Research Methods” Phillips, R. C. and C. P. McRoy (UNESCO, Paris 1990).

3.2 Project site:

The project site was selected at the Cam Hai Dong village, Cam Ranh bay, Khanh Hoa province (Fig.1, 2, 3)

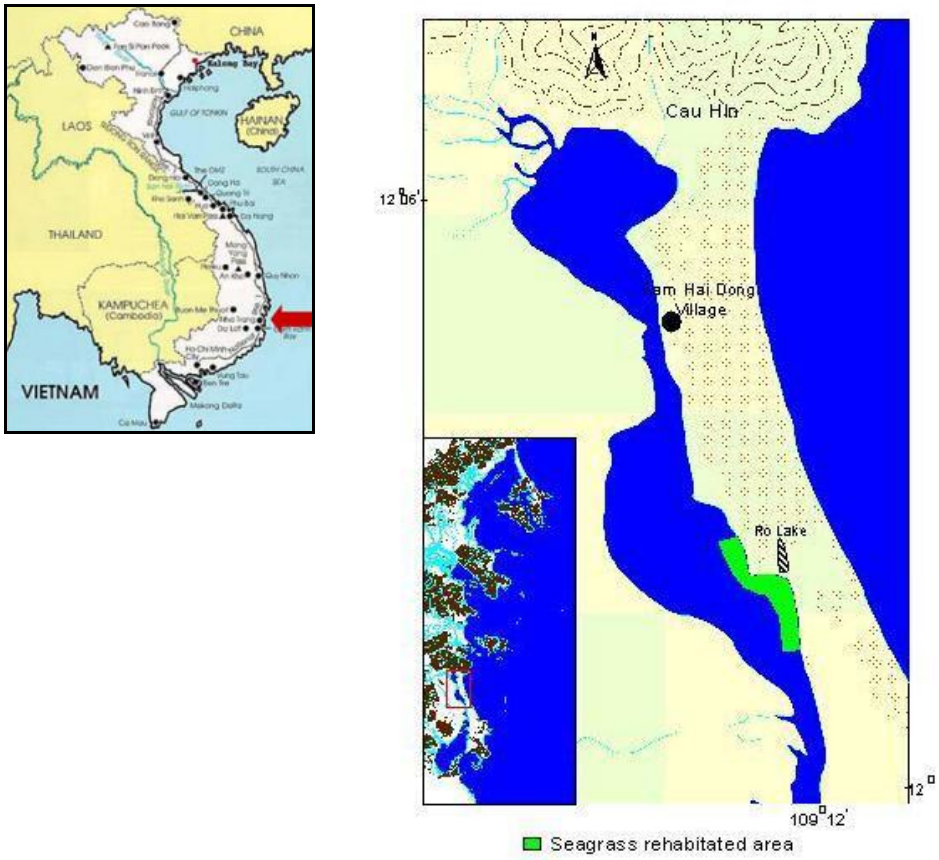

Fig. 1. Map showing the seagrass rehabilitated area at Cam Hai Dong, Cam Ranh bay

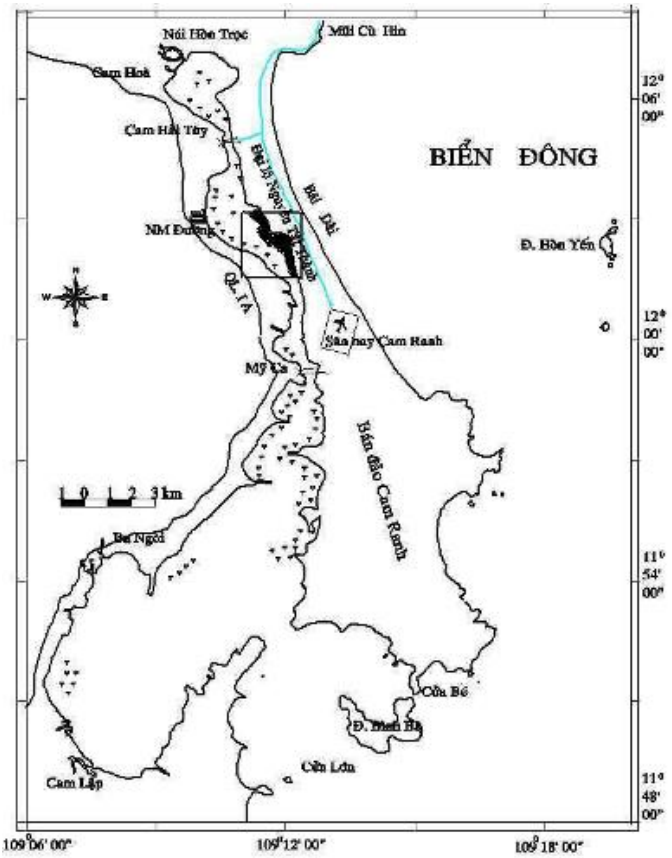

Fig. 2. Seagrass rehabilitated area at Cam Hai Dong, Cam Ranh bay

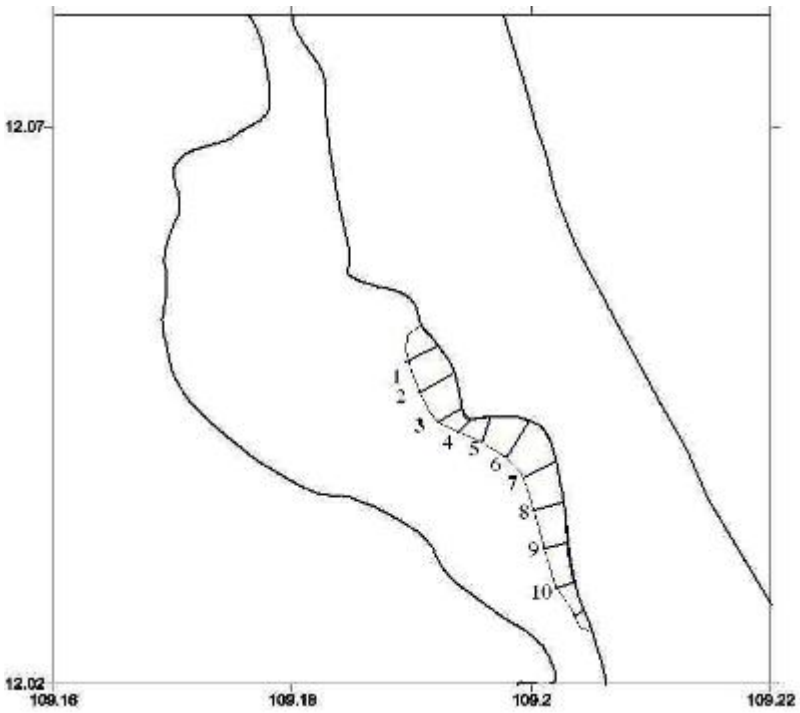

Fig. 3. Transect sketch of the rehabilitated area

3. 3 Duration of the project:

This project was implemented from January 2007 to June 2008 and the local community participated to replant and manage the seagrass meadows.

Training workshops and meetings were organized every 3 months in order to transfer the techniques of restoration and conservation seagrass habitat and associated fauna to the local community. The skills of rearing the sea-horse and sea-cucumber were also transferred to them.

Economically, the people should be better off and certainly in the long-term they will benefit by sustainable use of their seagrass resources.

These workshops and meetings also helped to increase the awareness of protection the natural seagrass ecosystem and build its capacity to conserve natural biological resources in seagrass beds.

3. 4 Planting techniques:

3.4.1 Seagrasses:

- The planting method of *Enhalus acoroides* by using vegetative organs (shoots of seagrasses). Shoots of seagrasses have been taken in the healthy seagrass population at Song Lo, Dam Gia (Nhatrang bay) Hon Khoi (Ninh Hoa, Khanh Hoa). The species *Enhalus acoroides* with long leaves at 1, 5 meters after removing cut the upper part of them, just maintain the shoots at 40- 50cm with its roots, transport them to the rehabilitated area as rapid as possible, dig a hole in the substratum at the dimension 10cm x 10cm at the depth of 15cm, the density of shoots for planting from 20-30 shoots per m2
- Seedlings of *Enhalus acoroides* at 2 months of age: seedlings have been carried out by germination of seagrass seeds in nursery at laboratory by collecting the old fruits of *Enhalus acoroides (at* Song Lo area, Nhatrang bay) and bring to the Laboratory, put them in the aquarium, after 2- 4 days seeds will be liberated and then cultivate in the aquarium using natural light. The density of cultivation is 400 seeds per m2 , after 2 months of age the height of seedlings is 20-30 cm. Transplant these seedlings to the rehabilitated area, the density for planting is 40-50 seedlings per m2

3.4.2 Sea-horse and sea-cucumber:

- Sea-horse (*Hippocampus kuda*): Juveniles of *Hippocampus kuda* at 60 days of age were supplied from the Laboratory of the Institute of Oceanography (artificial spawning) and transported to the rehabilitated areas.
- Sea-cucumber (*Holothuria scabra*): Juveniles of *Holothuria scabra* were supplied by fishermen from nature (collected at Cam Ranh bay and Van Phong bay area's)
- Rearing them in the seagrass areas covered by net, with the density at 10 *Hippocampus kuda*/m2 and 10 *Holothuria scabra*/m2. An amount of 1000 *H. kuda* at 50- 60 mm long and 1000 *H. scabra* at 80-100gram weight were reared.

3.4.3 Methods of study the leaf growth rate and leaf production:

- Leaf growth rate of seagrasses: by using the leaf-marking method, use a syringe needle to create a hole at the basal meristem of the leaft, the traces will appear, after one time of t days. The distance between the basal meristem and leaf marks made above the region of cell elongation can be used for measuring of leaf growth. The leaf growth rate/day will calculate by the formula:

$$\mu = \frac{\Delta L}{t}$$

In there: μ is leaf growth rate: cm/day; ΔL: average growth rate for the marked leafs in the time of experiment; t: duration of experiment.

- Leaft production: Leaf production values can be calculated from leaf-making techniques. Leaf materials can be separated into leaf tissue produced before (above mark) and after marking (below mark and unmarked leaves), dried 24 h at 80ºC and weigh and then calculate the average per shoot. The value of leaf production gram/m2 is product of the density of shoot in each m2 and average leaf production per shoot.

3.4.4 Management and taking care of the rehabilitated area at Cam Hai Dong, Cam Ranh bay:

Local community participated to take care and guarded the rehabilitated area includes the replanting seagrass area, the rearing of sea-horse and sea-cucumber area covered by net.

Management of seagrass meadows has been assessed by random sampling of target species and evaluation of their survival. The growth rate of leaves by transects method.

In the future the local community has authority to exploit reasonably the biological and environmental resources of seagrass ecosystem.

4. RESULTS.

4.1 The natural environmental elements in the rehabilitated area – Cam Hai Dong- Cam Ranh:

Some natural environmental elements were calculated, among them the number of exposed times by daytime were studied because it affect to the existence of seagrasses, the result is showed as follows (Table 1):

Table 1: The natural environmental elements in the rehabilitated area

Time (month)	The average temperature of sea water at 12 :00 noon (° C)	Exposed time of low tide by daytime (hour/day)	The average of salinity (‰)
April/2007	29,5	4hours(afternoon)	34
May/2007	31 4-	5hours(afternoon)	34
June/2007	32 4-	5hours(afternoon)	34,5
July/2007	32	4hours(afternoon)	34,5
Aug./2007	29	3hours(afternoon)	34
Sept./2007	28	2hours(afternoon)	30
Oct./2007	27,5	1hours(afternoon)	21
Nov./2007	26,5	1-2hours(morning)	18
Dec./2007	25	2 hours (morning)	19
Jan./2008	25,5	1hour(morning)	20
Feb./2008	27,5 1-	2hours(morning)	28
March/2008	29	3hours(afternoon)	32
April/2008	29	4hours(afternoon)	33

4.2 Species diversity of seagrasses in the rehabilitated area:

In the rehabilitated area the seagrasses distributes in separated communities, sometimes in mixed community, among them the *Enhalus acoroides* is dominant, the length of leaf attains 2 meters long, *Halophila ovalis* and *Halophila minor* grow from the low littoral zone to the sublittoral at the depth of 3-4 meters, *Halophila beccarii* just distributes in the low littoral zone along the slot of sea-water, *Halodule uninervis* distributes everywhere in the area, *Thalassia hemprichii* is sparse and just distributes on the bottom with sand-mud or on the sandy mound and sparsely grows on mud.

– *Enhalus acoroides* community:

Dominantly distributes everywhere from the low littoral to the sub-littoral at 2-3 meters in depth, the average density 40-60 shoots per m2 sometimes attains 100 shoots/m2 , the coverage attains 50-80% sometimes attains 100% the substratum, the length of leaf attains 1,50- 2 meters long.

– *Halophila ovalis* and *Halophila minor* communities:

Popularly distribute from the middle littoral to the deepest of the area, due to the competition the sunlight they grow only outside the belt of *Enhalus acoroides.*

– *Halophila beccarii*:

Grows densely in the low littoral zone, it likes living in the brackish water so we can see them along the slot where the fresh water flows to the lagoon.

– *Thalassia hemprichii*:

Just grows on the substratum of sandy mud on the dune of the lagoon, it sparsely distributes. The dimension of leaf is big, it breadth attains 1,5cm.

The result of study on 10 transects in September 2007 at the rehabilitated area is showed as follows (Table 2):

Table 2: Density, coverage and biomass of seagrasses at the rehabilitated area

Species	**Density (shoots/m2)**	**Coverage (%)**	**Biomass (dried gram /m2)**
Enhalus acoroides	28-96 (aver.: 56)	50-100 (aver.: 80)	302,60- 1060,00 (aver.:483,46)
Halophila ovalis	700-2800 (aver.:1682)	10-80 (aver.: 30)	16,25-128,75 (aver.: 67,37)
Halophila minor	2925-10450 (aver.: 5940)	10-50 (aver.: 20)	12,75-142,50 (aver.: 82,55)
Halophila beccarii	3200-4700 (aver.: 3950)	10-60 (aver.: 30)	40-56,20 (aver.:48,10)
Halodule uninervis	3775-9150 (aver.: 6191)	10-60 (aver.: 40)	83,75-307,50 (aver.: 48,10

4.3 Transplantation the *Enhalus acoroides* for planting:

The area of seagrass loss have been restored about 5 hectares. The planting method using vegetative organs (shoots of seagrasses). Shoots of seagrasses have been taken in the healthy seagrass population.

Seedlings at 2 months of age of *Enhalus acoroides* also be used, these seedlings have been carried out by germination of seagrass seeds in aquarium.

4.3.1 For the shoots method:

Studied on the leaf growth rate and leaf production of the transplanted seagrasses and natural seagrasses were implemented from April/2007 to April/2008. The result is showed as follows (Table 3):

Table 3: Leaf growth rate and leaf production of *Enhalus acoroides* (transplanted seagrasses and natural seagrasses)

Time (month)	**Average density (shoots/m2)**		**Average biomass(dried gram/m2)**		**Leaf growth rate (cm/day)**		**Leaf production (dried gram/m2/day)**	
	Natural seagr.	Transpl. seagr.	Natural seagr.	Transpl. seagr.	Natural seagr.	Transpl. seagr.	Natural seagr.	Transpl. seagr.
April/07	68±9	30±3	78±9		1,20±0,2		1,64±0,2	
May/07	59±8	29±3	83±11		1,21±0,2		1,74±0,2	
June/07	102±10	28±3	315±30		1,14±0,1		1,12±0,2	
July/07	82±9	28±3	256±24	64±6	1,64±0,2	0,92±0,2	3,45±0,3	2,16±0,2

Aug/07	90±10	26±3	268±25	65±6	1,73±0,3	1,12±0,2	3,86±0,3	2,15±0,2
Sept./07	100±10	26±3	308±28	68±6	1,80±0,3	1,13±0,2	4,45±0,4	3,05±0,3
Oct./07	90±10	25±3	262±25	70±7	1,16±0,2	0,87±0,2	2,92±0,3	1,85±0,2
Nov./07	110±10	24±2	269±25	63±6	0,58±0,1	0,49±0,1	1,13±0,2	0,68±0,2
Dec./07	60±8	22±2	82±11	38±4	0,57±0,1	0,51±0,1	0,98±0,2	0,35±0,1
Jan./08	56±8	25±3	62±9	47±5	0,55±0,1	0,60±0,2	0,56±0,2	0,31±0,1
Feb./08	60±8	27±3	74±8	48±5	0,87±0,1	0,63±0,2	1,12±0,2	0,56±0,1
Mar./08	68±8	26±3	124±13	64±6	1,31±0,2	0,84±0,2	1,80±0,2	0,94±0,2
April/08	70±9	25±3	82±11	69±7	1,23±0,2	0,90±0,2	1,62±0,2	0,90±0,2

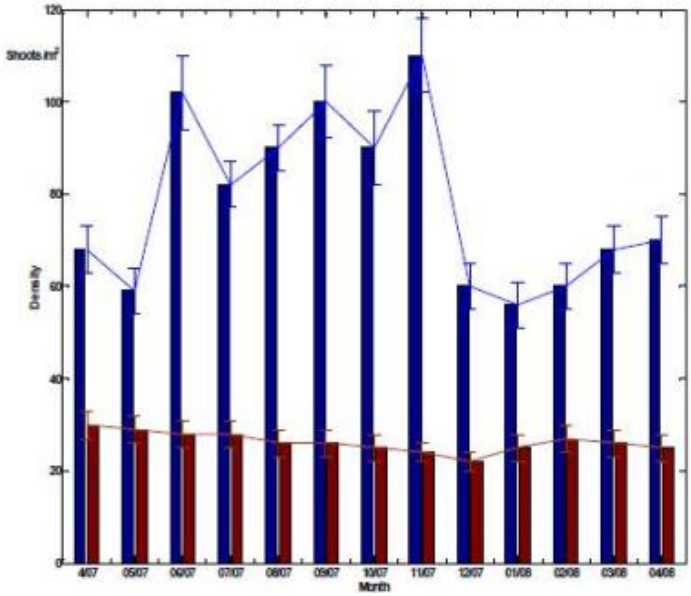

Fig. 4. Variation of density of *Enhalus acoroides* in the rehabilitated area.
(density of natural seagrasses density of transplanted seagrasses

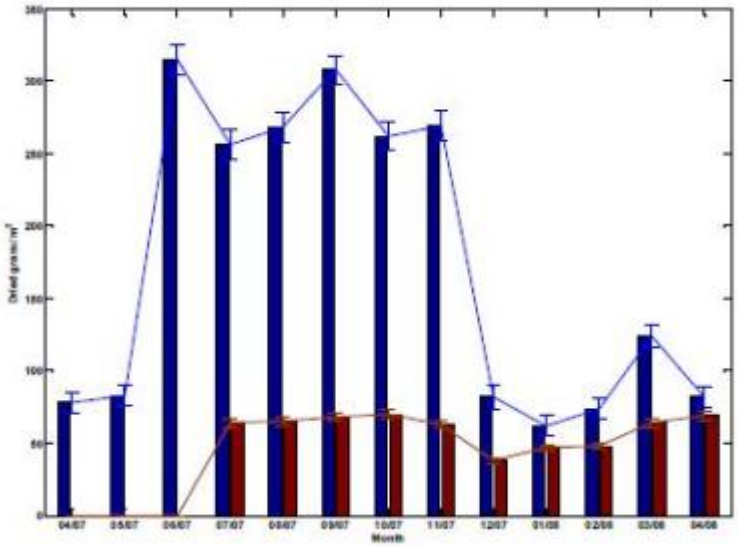

Fig. 5. Variation of biomass of *Enhalus acoroides* in the rehabilitated area.
(biomass of natural seagrasses biomass of transplanted seagrasses)

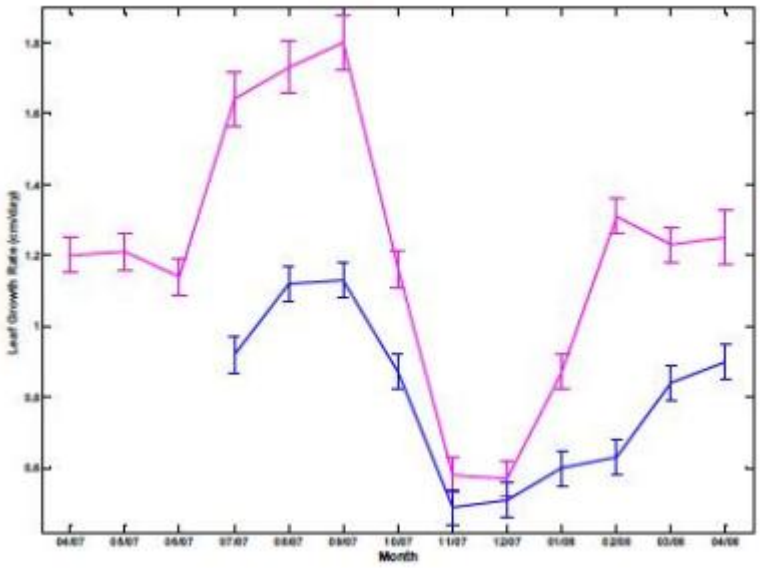

Fig. 6. Variation of leaf growth rate of *Enhalus acoroides* in the rehabilitated area.
(-----: leaf growth rate of natural seagrasses; -----: leaf growth rate of transplanted seagrasses)

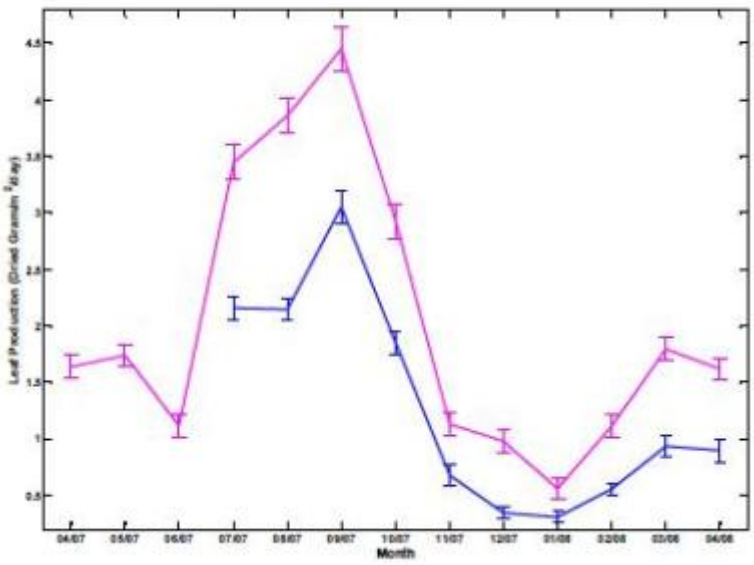

Fig. 7. Variation of leaf production of *Enhalus acoroides* in the rehabilitated area.
(-----: leaf production of natural seagrasses; -----: leaf production of transplanted seagrasses

4.3.2 For the seedlings method:

Studied on the leaf growth rate and leaf production of the seedlings transplantation was implemented from July / 2007 to April / 2008. The result is showed as follows (Table 4):

Table 4: Leaf growth rate and leaf production of seedlings at 2 months of age of *Enhalus acoroides* (transplanted methods)

Time	**Average density (shoots/m2)**	**Leaf growth rate (cm/day)**	**Leaf production (dried gram /m2/day)**
July/2007	50±5		
August/2007	50±5 0,	53±0,2	1,57±0,3
Sept/2007	48±5	0,80±0,3	1,67±0,3
Oct/2007	46±5	1,05±0,3	2,28±0,6
Nov/2007	43±5	0,9±0,3	2,10±0,5
Dec/2007	35±4	0,60±0,2	1,96±0,4
Jan/2008	40±4	0,70±0,3	1,78±0,4
Feb/2008	42±4	1,15±0,3	2,10±0,5
March/2008	44±4	1,10±0,3	2,03±0,5
April/2008	46±5	1,03±0,3	2,10±0,5

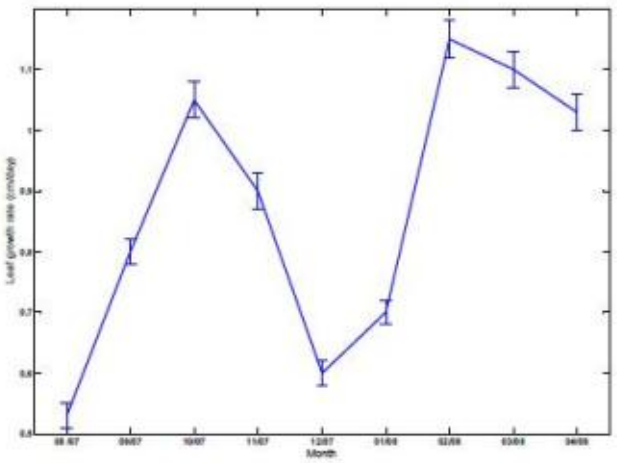

Fig. 8. Variation of leaf growth rate of *Enhalus acoroides* in the rehabilitated area. (-----: leaf growth rate of seedlings)

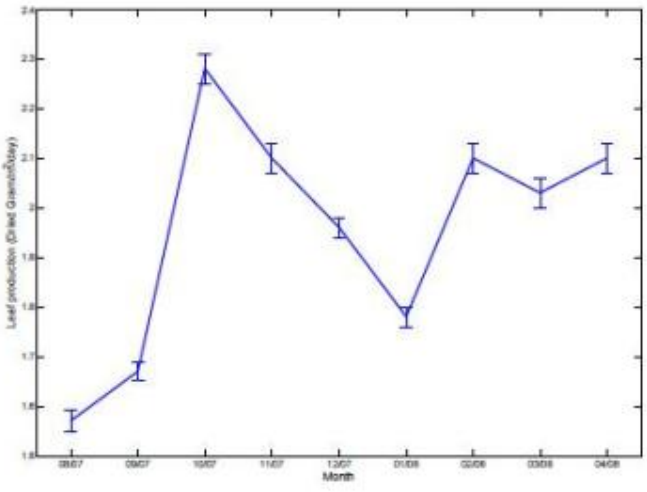

Fig. 9. Variation of leaf production of *Enhalus acoroides* in the rehabilitated area. (-----: leaf production of natural seagrasses)

4. 4 Results of restoration the sea-horse at the rehabilitated area:

The juveniles of sea-horse (*Hippocampus kuda)* after spawning 2 months of age in aquarium were reared in the seagrass area covered by net, each month they were checked and calculated the length and weight, the result of calculation is showed as follows(Table 5):

Table 5: The average length growth and weight of cage cultured of *Hippocampus kuda* in the rehabilitated area.

Time (days)	**Initial length of juveniles of *H. kuda* (mm)**	**Initial weight of juveniles of *H. kuda* (gram)**	**Length after rearing of *H. kuda* (mm)**	**Weight after rearing *H. kuda* (gram)**
0	54,60±5,30	0,68±0,21		
30			76,05±6,02	2,68±0,60
60			82,07±4,98	3,21±0,52
90			93,03±4,32	4,30±0,58
120			98,68±6,54	4,72±0,82
150			102,02±7,12	4,98±0,90
180			110,21±8,13	5,12±1,13

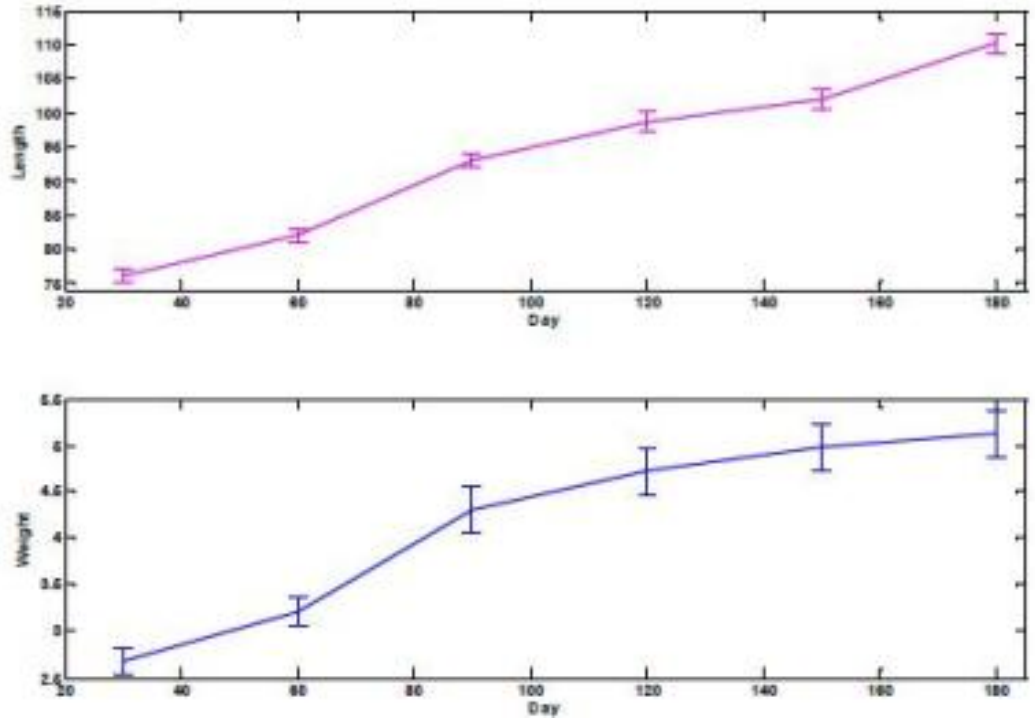

Fig. 10. Variation of the length and weight of *Hippocampus kuda* in the seagrass beds covered by net. (-----: variation of length -----: variation of weight)

Table 6: The survival rate of cage cultured of *H. kuda* is showed as follows:

Time (days)	**Juveniles of *H. kuda* (n)**	**Juveniles of *H. kuda* (%)**
0	1000	100
30	831	83,1±3
60	605	60,5±3
90	570	57±2,8
120	603	60,3±2
150	430	43±1,5
180	320	32±1,3

4.5 Result of restoration the sea-cucumber at the rehabilitated area:

The juveniles of sea-cucumber(*Holothuria scabra*) were supplied from nature and were reared in the seagrass area covered by net, each month they were checked and calculated the length and weight, the result of study is showed as follows(Table 7):

Table 7: The average length growth and weight of cage cultured of *Holothuria scabra* in the rehabilitated area.

Time (days)	**Initial length of juveniles of *H. scabra* (mm)**	**Initial weight of juveniles of *H. scabra* (gram)**	**Length after rearing of *H. scabra* (mm)**	**Weight after rearing *H. scabra* (gram)**
0	150±15	100±12		
30			180±15	170±17
60			210±16	230±18
90			280±18	360±28
120			310±20	460±32

Table 8: The survival rate of cage cultured of *Holothuria scabra* is showed as follows:

Time (Days)	**Juveniles of *H. scabra* (n)**	**Juveniles of *H. scabra* (%)**
0	1000	100
30	965	96,5±8,5
60	870	87±8,2
90	780	78±7,5
120	760	76±7,1

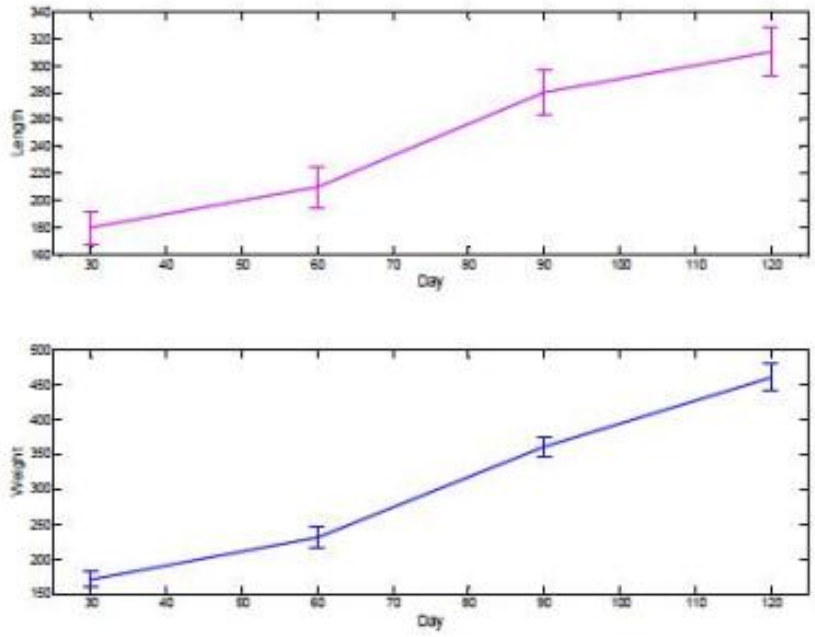

Fig. 11. Variation of the length and weight of *Holothuria scabra* in the seagrass beds covered by net. (-----: variation of length -----: variation of weight)

5. CONCLUSION:

The project accomplished its proposed objectives: implemented to replant 5 ha of seagrasses (Enhalus *acoroides*) in the rehabilitated area by two methods: Shoots planting and seedlings planting. The preliminary study showed that the seagrasses were adapted to the new planting area and the average leaf growth rate of *Enhalus acoroides* attained 1,13cm/day for the shoots planting method (Sept/07) and 1, 15 cm/day for seedlings planting methods (Feb/08). The rate of survival of the transplanting seagrasses was high and attained at 85% for both of the two planting methods.

Along with the replanting seagrasses, the restoration of marine animals which were the endemic marine life in the seagrasses were carried out such as sea-horse (*Hippocampus kuda*) sea-cucumber(*Holothuria scabra*) the growth rate and survival rate were high(Table 6, 8)and the result of this experimental rearing will be the model for the local community of their livelihoods.

In participating to the workshop trainings and to replant the seagrasses and marine animals the awareness of local community were increased, they were trained and transferred the technologies and methods to restore and sustainably use seagrass ecosystems, they can manage and sustainably exploit the biological resources in seagrass beds.

An added bonus to these activities is conserving habitat for animals that live outside seagrass meadows but use them as nursery or breeding areas.

Seagrass restoration will increase biodiversity values and villagers can be expected to take part in restoration activities bringing the community together for planting operations. This initial project will bring knowledge to the people of the village and build its capacity to conserve natural resources.

6. RECOMMENDATION FOR FUTURE WORK :

In order to help the local community surroundings the conserved seagrass meadows to earn their livelihoods stably, we propose the project have to continue to open training course for training

the skills in planting the other economic objects such as: seaweeds(*Kappaphycus alvarezii, Kappaphycus striatum, Gracilaria heteroclada*) marine animals such as: clam, Oyster, bivalves…

Continue to monitor the restored seagrass area and replant the seagrass loss, open the training workshops in order to advance the awareness to the community on conserve natural resources, maintain the biodiversity , protection the coastal environment.

A suitable management regime can be introduced that will allow villagers to harvest their food products and sustain the biodiversity of the seagrass meadows. In the long-term it is to their advantage to carry out a sustainable management plan for the seagrass bed.

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APPENDIX :

Fig.1. Local communities are attending in the training course of rehabilitation and conservation the seagrass beds.

Fig.2. Local communities were taught the methods of planting the seagrasses.

Fig.3. Young people of the village are practising to plant the seagrasses, Pham Huu Tri, No 3 from left of the first row ..

Fig. 4. Young people of the village are planting the seagrasses in the rehabilitated area.

Fig.5. Collecting the fruits of Seagrasses *(Enhalus acoroides).*

Fig. 6 Fruits of seagrasses *Enhalus acoroides*

Fig. 7. Plants of Enhalus acoroides bringing the fruits

Fig.8. Fruit with the seeds inside

Fig. 9. Seeds of seagrasses Enhalus acoroides

Fig.10. Germination of seeds of Enhalus acoroides

Fig.11. Seedlings of Enhalus acoroides are planting in the Aquarium.

Fig.12. Seedlings after 2 months planting are available to transplant in the rehabilitated areas

Fig. 13. Seagrass beds at Cam Hai Dong after 5 months replanting(Took photograph when the low tide)

Fig.14. Measure the growth rate and density of seagrasses after 5 months replanting at Cam Hai Dong, Cam Ranh bay(Took photograph when the low tide)

Fig.15. Juveniles of sea-horse after 15 days of artificial spawning in aquarium

Fig.16. Juveniles of sea-horse after 2 months of artificial spawning in aquarium

Fig.17. Breeding the sea-cucumber in the pilot rearing in seagrass meadows covered by net

Fig. 18. A pilot rearing in seagrass meadows at Cam Hai Dong, Cam Ranh bay.

Fig. 19. Checking the sea-cucumber in the pilot rearing in seagrass meadows after 6 months rearing.

Fig. 20. Checking the sea-horse in the pilot rearing in seagrass meadows covered by net.

Fig 21. Measure the growth rate of sea-horse after 4 months rearing in the rehabilitated areas

Fig 22. Measure the growth rate of sea-cucumber after 6 months rearing in the rehabilitated areas

BIODIVERSITY IN THE SEAGRASS MEADOWS BEFORE DEGRADING

Fig.23. Biodiversity in the seagrass meadows at Cam Hai Dong, Cam Ranh bay (before degrading)

Fig. 24. Fishing in the seagrass meadows at Cam Hai Dong, Cam Ranh bay (before degrading)

Fig. 25 Sea-horse, an animal's living in seagrass beds.

Fig.26 Turtles in the seagrass meadows

Fig.27 Seagrass beds is the living environment of Shrimps

Fig.28 Many species of seaweeds live together with seagrasses