

# Report on Seagrass Monitoring Training in Komodo National Park

July 26<sup>th</sup> – August 3<sup>rd</sup> 2002



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## Background:

Komodo National Park (KNP) is a World Heritage Site and known for its Komodo dragons (*Varanus komodoensis*). Located in Nusa Tenggara Timur Province (NTT) – Indonesia, KNP covers 603 km<sup>2</sup> of land and 1,214 km<sup>2</sup> of marine area (Figure 1). Upon the request from the Ministry of Forestry – Directorate General for Forest Protection and Nature Conservation (PHKA), The Nature Conservancy Coastal and Marine Program – Indonesia (TNC – CMPI) presently provides assistance for KNP's coastal and marine conservation management.



**Figure 1.** Map of Indonesia with location of Komodo National Park.

Marine biodiversity in Komodo National Park includes 1000 species of fishes, 260 species of reef-building corals, 70 species of sponges, 2 species of turtles, resident manta rays populations, and 18 species of whales and dolphins. Seagrass communities are also found in the Park. These highly productive systems are important nutrient traps and they stabilize the sandy bottoms of bays and lagoons. Furthermore, they are an important shelter for young fish and invertebrates, and they are a food source for dugongs that are occasionally spotted in the Park, sea turtles, molluscs and sea urchins.

It is known that seagrass beds are found mostly in the Northern area of the Park, but their spatial distribution has not been properly assessed. Given the importance of seagrasses there is a need to assess their spatial distribution, species composition and condition. A better understanding of seagrass will help to timely identify threats and to take conservation action where needed. Therefore a seagrass monitoring program was developed in cooperation with *SeagrassNet* and *Seagrass Watch*.

### *SeagrassNet*

*SeagrassNet* is a thorough seagrass monitoring approach that provides observers with comprehensive data on species composition and condition. The approach requires considerable time and effort, both in the field and in laboratory. Hence, spatial coverage is traded off against more detailed information per unit sampling effort. This

monitoring technique can only be implemented by well-trained scientists and Park monitoring personnel. SeagrassNet sites are being set up around the world.

### *Seagrass Watch*

Seagrass Watch is a seagrass monitoring approach that was designed to allow rapid assessment of seagrass community by both scientists and the general public. This method is relatively easy to implement and may be used to provide general information of seagrass distribution in a large area. Hence, detailed information is traded off against a higher spatial coverage per unit sampling effort.

### **Training Activities:**

*Day 1, Saturday - July 27<sup>th</sup> 2002*

All participants and trainers arrived at *Seraya Kecil* with KNP Satalibo speedboat. *Seraya Kecil* is an Island with limited tourism activities and basic facilities (Figure 2). The island is located Northeast of KNP border.

Later in the afternoon, Peter Mous and all the trainers had a quick swim on the Eastern side of *Seraya Kecil*) to survey the seagrass bed and they collected some specimens for training purposes. In the evening, Peter Mous formally introduced the training participants (consisted of KNP staff, TNC Komodo monitoring and community awareness team members, WWF and partners from Riung, NTT) to the seagrass monitoring trainers: Fred Short (University of New Hampshire), Len McKenzie, Stuart Campbell and Juanita Bite (Dept. of Primary Industries Queensland). Both Fred Short and Stuart Campbell gave brief presentations on *SeagrassNet* and *Seagrass Watch* methods for seagrass monitoring (Figure 3).



**Figure 2.** Training base camp *Seraya Kecil*.



**Figure 3.** Fred Short presents *SeagrassNet* method.

*Day 2, Sunday - July 28<sup>th</sup> 2002 (Location: Seraya Kecil)*

Peter Mous led an expedition with Fred Short and Juanita Bite to neighbouring Komodo National Park to decide which of the seagrass fields would be suitable for monitoring and training. The rest of the participants stayed on *Seraya Kecil* to learn about basic seagrass identification techniques (Figure 4 and 5). Training on percentage cover estimation was also performed on dry land (Figure 6).



**Figure 4.** *Stuart Campbell and Len McKenzie explain seagrass identification techniques.*



**Figure 5.** *Stuart Campbell explains basic species identification.*



**Figure 6.** *Percentage cover estimation on dry land.*

In the afternoon, both Len Mc Kenzie and Stuart Campbell started the first seagrass monitoring field exercise based on the *SeagrassWatch* protocols. The exercise took

place on the eastern seagrass bed of *Seraya Kecil*, just in front of the guests' rooms (Appendix 1). During the exercise, participants learned how to lay out *Seagrass Watch* transects, they performed seagrass species identification and determined the species composition and percentage of seagrass cover in each quadrat, took photographs from a selected number of quadrats observed, and recorded all relevant data (i.e. sediment type and other life forms observed) onto a *Seagrass Watch* datasheet.

*Day 3, Monday – July 29<sup>th</sup> 2002 (Location: Seraya Kecil)*

During the morning session, Fred Short demonstrated the *SeagrassNet* monitoring methods on the seagrass bed at the eastern part of Seraya Kecil (Figure 7; Appendix 1). Participants learned how to lay out transects and permanent markers on the seagrass bed, identified seagrass species and percentage composition observed in each quadrat, determined seagrass' percentage cover per quadrat, took biomass samples by coring outside the quadrat for similar and dominant species inside the quadrat observed, took photographs for every quadrat observed, estimated canopy height, and measured the distance from the last transect points to the edge of the seagrass bed. All the data were recorded onto *SeagrassNet* data sheet and all the biomass samples were placed inside labelled mesh-bags.

After the *SeagrassNet* field monitoring exercise had been completed, the participants learned how to process the biomass sample (Figure 8). Fred explained the procedures to process the extracted biomass sample: how to clean the sample, separate the samples according to their species, determine the number of shoots, divide samples into separate parts (roots & rhizome, shoot and stem, leaf). All of these samples were then put inside labelled aluminium-foiled pouch and datasheets were filled out for forwarding to *SeagrassNet* coordinators at the University of New Hampshire.



**Figure 7.** *SeagrassNet* and *Seagrass Watch* sites, Seraya Kecil island



**Figure 8.** Fred Short demonstrates lab procedures for biomass sample analysis

Day 4, Tuesday – July 30<sup>th</sup> 2002 (Location: Papagaran, KNP)



**Figure 9.** Mr. Abu Lahar, the Village Secretary of Papagaran island, observed the training from the speedboat

All participants and trainers went to Papagaran Island to meet the village representative and to seek permission to conduct seagrass monitoring program around the island. Matheus Halim, Head of KNP, Mirza Pedju, Maryam, and Stuart Campbell, met Abu Lahar, the village secretary (Figure 9). They briefed Mr. Lahar about the purpose of seagrass monitoring and conservation in KNP and ensured that the monitoring activity will create no disturbance with other villagers' activities (i.e. fishing and boat access around the island). Mr Lahar was also informed that the *SeagrassWatch* method was suitable for the villagers to participate in the seagrass monitoring. Finally, Mr Lahar endorsed the seagrass monitoring activity to be implemented around the island. He was keen to suggest some of the possible monitoring sites nearby Papagaran.

Eventually, Fred Short and the monitoring participants found a suitable site for *SeagrassNet*. The site was located northeast of Papagaran island (Appendix 2). The participants performed the *SeagrassNet* monitoring at this site. Mr Lahar and Mr. Halim observed the monitoring exercise.

Day 5, Wednesday – July 31<sup>st</sup> 2002 (Location: Seraya Kecil)

The participants were divided into 2 groups. Fred Short led the first group who was tasked with the processing of the biomass sample collected from Papagaran island, and to finish monitoring the last *SeagrassNet* transect at Seraya Kecil. Stuart Campbell and Len McKenzie coordinated the second group to go to the western part of the island to establish the second *SeagrassWatch* site (Figure 10; Appendix 1).

Furthermore, Fred Short demonstrated how to deploy and utilize the light and temperature logger to Andreas Muljadi, Purwanto, Ande, Seno, Modesta, and Marthen Leuna. Fred also displayed the use of refractometer to measure water salinity (Figure 11). These devices were used to incorporate environmental parameters data for *SeagrassNet* monitoring. Fred Short handed out light and temperature loggers for KNP and Riung Reserve (received by WWF – Nusa Tenggara representatives, i.e. Modesta Meme and Marthen Leung). Palmtop computers, and waterproof GPS sets were also donated to KNP and WWF/Riung representatives.

Based on the monitoring results there were 9 seagrass species found in Seraya Kecil. (Appendix 4)



**Figure 10.** *Second Seagrass Watch site, Seraya Kecil island*



**Figure 11.** *Purwanto uses the refractometer to measure water salinity for SeagrassNet monitoring.*

*Day 6, Thursday – August 1<sup>st</sup> 2002 (Location: Papagaran island, KNP)*

Most of the participants went back to Papagaran Island to establish two *Seagrass Watch* monitoring sites (Appendix 2). Andreas Muljadi and A. Seno remained on Seraya Kecil to finish processing of biomass samples.

Once arrived at Papagaran, Ande Xevi, Siti Maryam, and Mirza Pedju reported to Haji Bahrin, the village chief, and Mr. Lahar. They briefed the village chief about the importance of seagrass monitoring and invited villagers to join the *Seagrass Watch* monitoring activity. The village chief allowed the monitoring activity and training to proceed and apologized that he could not take part due to other outstanding issues that needed his immediate attention. The village secretary introduced the monitoring team to potential villagers who expressed their interest to take part in the activity. The monitoring team explained clearly that the activity was meant to be voluntary and that no financial compensation would be given (only lunch boxes were provided). Eventually, eight volunteers agreed to join the monitoring exercise.

Fred Short explained briefly about the importance of seagrass ecosystem and showed various species of seagrass from the identification sheet provided (Figure 12). The volunteers, age range of 15 – 21 years old, seemed to grasp the concept and were able to identify the seagrass species without any difficulty.

The monitoring group were then split into two. The first group went to establish a *Seagrass Watch* site at a location perceived as relatively non-impacted area at the western part of the island, while the other went to the seagrass bed in front of the village settlement (Northwestern part of the island) that seemed to be more heavily impacted (Appendix 2). The two groups performed seagrass monitoring and established *Seagrass Watch* sites on Papagaran seagrass beds. The volunteers from the Papagaran village in particular looked comfortable in performing the monitoring exercise and were able to provide reliable data.





**Figure 12.** Volunteers from Papagaran prepare for Seagrass Watch activity

Most of the species found at these two sites were *Enhalus acoroides* and *Thalassia hemprichii*.

Meanwhile, Fred Short went to the earlier established *SeagrassNet* site to deploy the temperature and light logger.

The monitoring team was able to wrap up the exercise by late afternoon before heading back to Seraya Kecil.

*Day 7, Friday – August 2<sup>nd</sup> 2002 (Location: KNP and Seraya Kecil)*

The seagrass monitoring participants and trainers explored the Park and visited Loh Buaya at Rinca Island. No further monitoring activities were carried out. Stuart Campbell, Juanita Bite and the rest of participants from WWF and Riung left Seraya Kecil in the evening to return to Labuan Bajo. Fred Short, Len McKenzie, Mirza Pedju, Siti Maryam, and KNP participants remained on Seraya Kecil.

Fred Short and Len McKenzie discovered another species, *Thalassodendron ciliatum*, in the Northwest seagrass bed area of Seraya Kecil.

*Final Day, Saturday – August 3<sup>rd</sup> 2002 (Location: Labuan Bajo)*

All the remaining monitoring participants and trainers left Seraya Kecil to head back to Labuan Bajo. Fred and Len debriefed Peter Mous about the training that had just been completed.

## Summary

- The seagrass monitoring training based on *SeagrassNet* and *SeagrassWatch* protocols was successfully conducted at Komodo National Park, NTT Province - Indonesia. The training participants comprised: staff of Komodo National Park and TNC – Komodo Field Office, as well as WWF – Wallacea and Nusa Tenggara and partners from Riung, NTT.
- Two *SeagrassNet* monitoring sites were identified and established. They were located at Seraya Kecil (i.e. outside Park boundary) and near Papagaran island (i.e. inside park boundary).
- Four *Seagrass Watch* sites were identified and established. Two sites were established on seagrass beds at Seraya Kecil island, and the other two were set up at Papagaran island.
- 9 seagrass species were identified in and around Komodo National Park (Appendix 4).
- The village community on Papagaran island endorsed seagrass monitoring and conservation to be implemented around their island.
- Volunteers from Papagaran island contributed and participated in the *Seagrass Watch* training.

## Recommendations

- The training was carried out at fairly high water level. Most participants had to use snorkelling gears and wetsuit to perform the monitoring activities. Ideally, monitoring should take place during low tide period when observers can walk and stand comfortably on the seagrass bed. Hence, future activities should be planned around low tide.
- If monitoring must be carried out by snorkelling and/or swimming, it is advisable to have a support boat, raft or sea kayak available nearby to carry monitoring supplies. Data recorders can also be positioned on the boat or sea kayak close to observers.
- Coring to extract biomass samples for *SeagrassNet* is difficult in deep water. It is suggested to do this on SCUBA.
- It is anticipated that processing of *SeagrassNet* samples can be completed in Komodo National Park. Therefore, the Park authority and TNC should consider to invest in drying oven, electronic weight scale, and other devices to enable them to process biomass samples collected in and around the Park.
- Better Internet access will enable faster data input for the *SeagrassNet* coordinators.
- To get a better idea on spatial distribution, the *SeagrassWatch* protocol could be adapted to cover an even larger area.

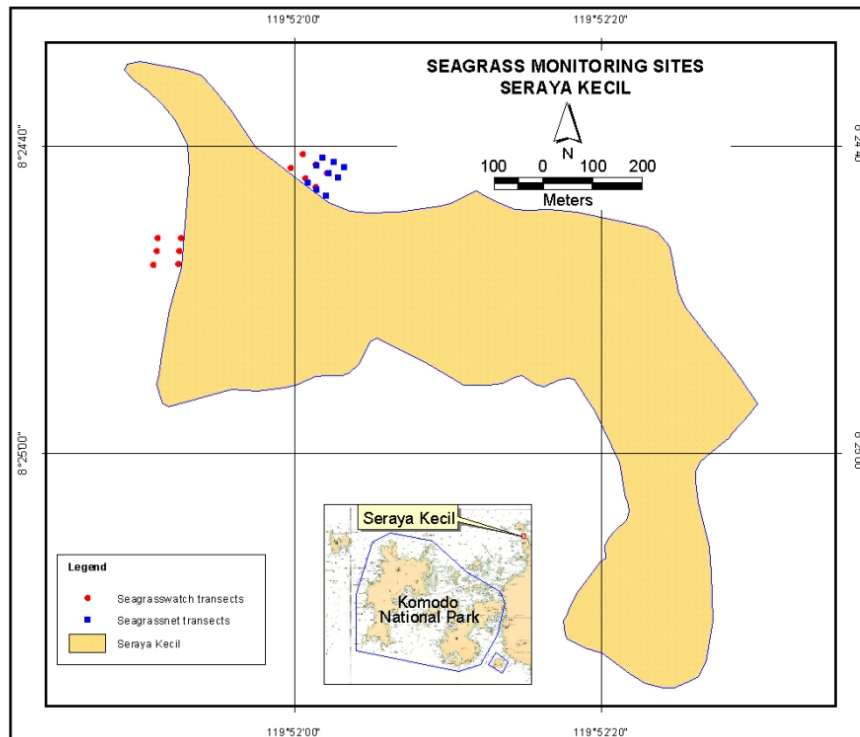
## Appendix 1. Monitoring Sites – Seraya Kecil

### *SeagrassNet*

No	Code of Location	Latitude	Longitude
1	IK161AC	824716	11952024
2	IK161AL	824708	11952014
3	IK161AR	824724	11952087
4	IK161BC	824697	11952086
5	IK161BL	824689	11952024
6	IK161BR	824702	11952047
7	IK161CC	824687	11952042
8	IK161CL	824680	11952030
9	IK161CR	824691	11952054

### *Seagrass Watch*

No	Location	No of Transect	Start		End	
			Lat	Long	Lat	Lon
1	SK1	1	824697	11951990	824677	11952009
		2	824703	11952013	824684	11952020
		3	824715	11952012	824694	11952028
2	SK 2	1	824796	11951880	824797	11951853
		2	824782	11951881	824761	11951854
		3	824769	11951883	824768	11951857



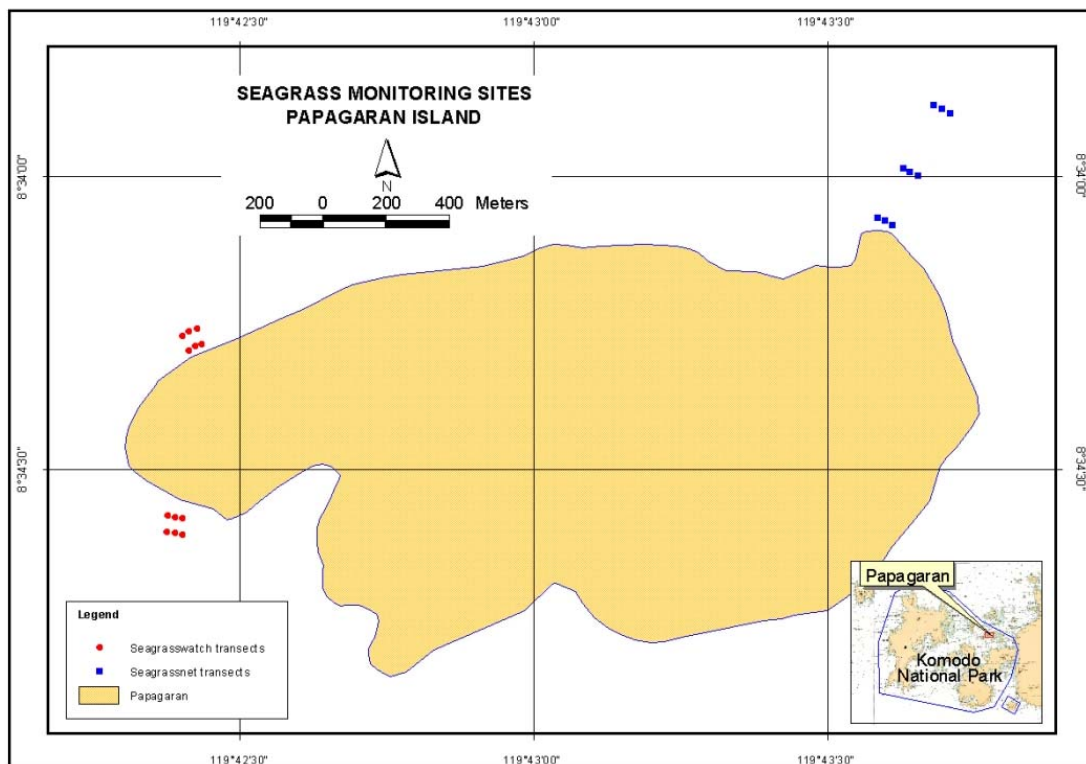
## Appendix 2. Monitoring Sites - Papagaran

### SeagrassNet

No	Code of Location	Latitude	Longitude
1	IK162AC	834078	11943599
2	IK162AL	834072	11943585
3	IK162AR	834068	11943606
4	IK162BC	833991	11943640
5	IK162BL	833991	11943633
6	IK162BR	834000	11943653
7	IK162CC	833886	11943695
8	IK162CL	833879	11943681
9	IK162CR	833896	11943711

### Seagrass Watch

No	Location	No of Transect	Start		End	
			Lat	Long	Lat	Lon
1	PG1	1	834296	11951880	834271	11942398
		2	834291	11942422	834266	11942412
		3	834288	11942433	834261	11942426
2	PG2	1	834587	11942402	834614	11942402
		2	834583	11942394	834611	11942389
		3	834582	11942361	834609	11942375



### **Appendix 3. List of Materials**

All materials required for both *SeagrassNet* and *Seagrass Watch* monitoring, except the drying oven and electric weighing scale, were supplied free of charge by Fred Short and Len McKenzie for KNP, TNC, and WWF – Nusra. For complete list of monitoring materials and procedures please refer to:

1. Short, F., McKenzie, L.J, Coles, R.g. and Vidler, K.P. 2002. *SeagrassNet Manual for Scientific Monitoring of Seagrass Habitat*. (QDPI, QFS, Cairns). 56pp
2. McKenzie, L.J and Campbell, S.J. 2002. *Seagrass Watch: Western Pacific Manual for Community (citizen) Monitoring of Seagrass Habitat*. (QFS, NFC, Cairns). 43pp

In addition the following materials were also used to assist the seagrass monitoring training in KNP:

1. 2 seat sea kayak
2. SCUBA dive set (for biomass sample extraction)
3. Snorkel sets
4. LCD beamer and a 2 X 3 m screen for presentations
5. Basic First Aid kit
6. Diver safety sausages (as surface marker buoys)
7. Satellite phone (ACeS) and hand-held radios

Transportation was provided by the Komodo National Park speedboat *Satalibo* throughout the training period. TNC's speedboat *Cakalang* was also used for a one-day expedition inside the Park.

#### **Appendix 4. List of Seagrass Species in KNP**

During the monitoring training, the following seagrass species were identified:

1. *Enhalus acoroides*
2. *Thalassia hemprichii*
3. *Cymodocea serrulata*
4. *Cymodocea rotundata*
5. *Halodule uninervis*
6. *Halophila minor*
7. *Halophila ovalis*
8. *Syringodium isoetifolium*
9. *Thalassodendron ciliatum*

**Appendix 5. List of Participants, Facilitators and Trainers:**

<b>Name</b>	<b>Organization</b>	<b>Note</b>
Ande Xevi	Komodo National Park	Participant
A Ganto Seno	Komodo National Park	Participant
Nurlaila Arafah Ivon	Komodo National Park	Participant
Andreas Muljadi	TNC – KFO, Monitoring coordinator	Participant
Purwanto	TNC – KFO, Monitoring Officer	Participant
Siti Maryam Yakob	TNC – KFO, Community Awareness and Education Assistant	Participant
Dr. Peter Mous	TNC – SEA CMPA, Manager of Science, Training, and Partnership	Supervision
Mirza Pedju	TNC – SEA CMPA, Program Officer – Science and Training	Facilitator
Fred Short, PhD	University of New Hampshire	Trainer
Dr. Stuart Campbell	Dept of Primary Industries Queensland – Australia	Trainer
Juanita Bite	Dept of Primary Industries Queensland – Australia	Trainer
Len McKenzie	Dept of Primary Industries Queensland – Australia	Trainer
Marthen Leuna	WWF - Wallacea	Participant
Modesta Y Meme	WWF – Nusa Tenggara	Participant
Abdurahman Sulaiman	Riung Fisher	Participant
Woltman Tuga	Marine and Fishery Office - Ngada	Participant
Raffael Rani	Representative of Riung Community	Participant
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### SeagrassWatch

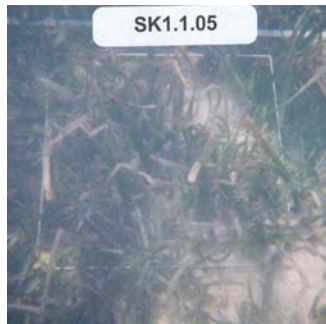
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### Web resources

The Nature Conservancy: [www.nature.org](http://www.nature.org)  
Komodo National Park: [www.komodonationalpark.org](http://www.komodonationalpark.org)  
SeagrassNet: [www.seagrassnet.org](http://www.seagrassnet.org)  
SeagrassWatch: [www.reef.crc.org.au/aboutreef/coastal/seagrasswatch.html](http://www.reef.crc.org.au/aboutreef/coastal/seagrasswatch.html)



**Appendix 7. Additional Pictures**  
(Courtesy of SeagrassWatch)



**a.** *Seagrass Watch quadrat at Seraya Kecil*



**b.** *SeagrassNet quadrat at Seraya Kecil*



**c.** *Seagrass monitoring trainers and Participants*



**d.** *Coring for biomass sample*



**e.** *Papagaran village*



**f.** *Training participants receiving instructions*



**g.** *Species identification training*



**h.** *Seagrass Watch transect at Seraya Kecil*

## **Acknowledgements**

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- *Taman Nasional Komodo (Komodo National Park) and TNC – Komodo Field Office*  
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