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**Status of the MMDC Giant Clam Hatchery – Republic of Palau
April 1988**

by
Gerald A. Heslinga, Thomas C. Watson and Theofanes Isamu
Micronesian Mariculture Demonstration Center
P.O. Box 359, Koror
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Giant tridacnid clams were historically an important seafood in the Indo-Pacific region, but in many areas natural stocks have been reduced to biological or economic extinction by subsistence and commercial harvesting. During the past five years the Pacific Fisheries Development Foundation (NMFS/NOAA), the US Department of the Interior, the UNFAO and other international agencies have funded a giant clam research and development program based at the MMDC laboratory in the Republic of Palau.

The MMDC has pioneered the development of a low-cost, low-technology system for giant clam spawning, larval culture, juvenile culture and growout in shallow coral reef waters. Clam growth rates under cultivation have been shown to be relatively rapid, even in the absence of food or fertilizer inputs. Techniques have been developed for control of pests, predators and algal fouling. A direct-drive diesel seawater pumping system has been implemented, eliminating dependence on municipal power grids.

MMDC personnel have cultured all of the seven tridacnid species, producing over one million seed clams and some 70,000 pounds of biomass. Of the seven species examined in Palau, *Tridacna derasa* has been found to combine the best biological attributes for farming. Several *Tridacna derasa* cohorts have been raised to full sexual maturity at age five years, and production of second-generation cohorts is now practiced routinely, giving independence from wild stocks and making selective breeding possible. Techniques have been developed for air-freighting seed clams abroad, and so far nearly 50 international shipments have been made. In 1987, revenues from sales of seed clams at the MMDC were used to expand the hatchery, doubling its size and production capacity. A further doubling in hatchery size will be undertaken in 1988-89 with grant financing from USDA/CTSA.

Low-technology methods for giant clam hatchery culture and growout are now being transferred, with demonstrable success, to a number of other countries in the region. Some 12 nations or nation-states in the tropical Pacific have undertaken personnel training and stock enhancement programs using seed clams produced and marketed by the MMDC. Ocean-based cultivation of giant clams is proving to be technically and socially feasible in some very remote Pacific island settings, where other kinds of marine and terrestrial farming are clearly impractical. For example, Yap State (FSM) has implemented a village clam production program, enabling more than 40 municipalities to initiate subtidal giant clam gardens using seed from Palau.

The MMDC's mariculture training and extension efforts have been formalized into a practical, 30-day short course called "Introduction to Giant Clam Mariculture." The course is offered on a continuous basis throughout the year and features hands-on experience with all aspects of clam culture, from spawning and larval rearing to ocean culture and broodstock management. Funding for this aspect of the program has come from PFDF (NMFS/NOAA), ICOD (Canada), the UNFAO, USAID, FFA and USDA/CTSA.

The MMDC has completed implementation of an on-site quarantine facility for treatment of shipments of seed clams destined for export to Pacific island countries. This is in response to SPC recommendations and to popular demand. The quarantine procedure follows specifications in use at James Cook University in Australia, and includes holding specimens in one-micron filtered, ultraviolet-sterilized seawater for a minimum of one month before export. All specimens are manually scrubbed and washed in chlorinated fresh water prior to quarantining.

Establishment of the MMDC clam quarantine facility was funded by the UNFAO Aquaculture Development Project based in Suva.

In recent months the MMDC has begun marketing one-year-old and two-year-old *Tridacna derasa* as aquarium specimens. Exports from the MMDC hatchery are routed to Honolulu, then to the US mainland and Europe (England and West Germany). The potential size of this market is not known but the current demand exceeds the MMDC's available supply. Opportunities exist for other hatcheries in the region to begin supplying aquarium markets.

Current program priorities for which the MMDC has secured funding include:

- 1) Expansion of tridacnid hatchery production facilities.
- 2) Doubling of enrollment in the Clam Mariculture Training Course.
- 3) Establishment of 30 new subtidal clam nurseries in the US-affiliated Pacific islands during the next two years.
- 3) Continuation of applied research on nutrient enhancement, selective breeding and symbiosis.
- 4) Exploration of new markets for clams and clam products.
- 5) Collaborative research on production economics.
- 6) Production of a manual and video on low-technology clam culture.

MMDC'S REGIONAL SERVICES

	PLACE	INFORMATION	TRAINING	CONSULTING	CLAM SEED	CLAM CAGES	BROODSTOCK
1	AM SAMOA	X	X	0	X	X	0
2	AUSTRALIA	X	X	X	0	0	0
3	COOK ISLANDS	X	X	0	X	X	0
4	FIJI	X	X	X	0	0	0
5	FR POLYNESIA	X	0	0	0	0	0
6	GUAM	X	0	X	X	0	X
7	HAWAII US	X	X	X	X	0	X
8	INDONESIA	X	X	0	0	0	0
9	JAPAN	X	0	0	X	0	0
10	KOSRAE FSM	X	X	X	X	X	P
11	KIRIBATI	X	0	0	0	0	0
12	MALDIVES	X	0	0	0	0	0
13	MARSHALL IS	X	X	X	X	X	0
14	NAURU	0	0	0	0	0	0
15	N. CALEDONIA	X	0	0	0	0	0
16	NIUE	X	0	0	0	0	0
17	PALAU	X	X	X	X	X	X
18	PNG	X	X	X	0	0	0
19	PHILIPPINES	X	X	X	X	0	0
20	POHNPEI FSM	X	X	X	X	X	0
21	SAIPAN	X	X	0	X	X	X
22	SOLOMON IS	X	0	X	0	0	0
23	TOKELAU	X	0	0	0	0	0
24	TONGA	X	0	0	0	0	0
25	TRUK FSM	X	X	0	X	X	0
26	TUVALU	X	X	0	P	P	0
27	VANUATU	X	0	0	0	0	0
28	W. SAMOA	X	X	0	P	X	0
29	YAP FSM	X	X	0	X	X	0
30							
31							
32							
33	TECHNICAL	INFORMATION	PROVIDED TO	28 COUNTRIES			LEGEND :
34							
35	TRAINING	COMPLETED BY	STAFF FROM	17 COUNTRIES			X - SERVICE PROVIDED
36							
37	ON-SITE	CONSULTING	PROVIDED IN	11 COUNTRIES			
38							0 - NOT PROVIDED
39		CLAM SEED	SHIPPED TO	13 COUNTRIES	(2 PENDING)		
40							
41		CLAM CAGES	SHIPPED TO	10 COUNTRIES	(1 PENDING)		P - PENDING
42							
43		BROODSTOCK	SHIPPED TO	4 COUNTRIES	(1 PENDING)		

GIANT CLAM MARICULTURE - 1987

	PLACE	OCEAN FARM	HATCHERY	SEED LOCAL	SEED EXPORT	TRAINING	RESEARCH
1	AM SAMOA	X	P	P	0	X	X
2	AUSTRALIA	X	***X	X	X	X	X
3	COOK ISLANDS	X	0	0	0	0	0
4	FIJI	X	P	P	0	P	X
5	FR POLYNESIA	0	0	0	0	0	X
6	GUAM	X	0	0	0	0	0
7	HAWAII US	0	0	0	0	0	X
8	INDONESIA	0	0	0	0	0	X
9	JAPAN	X	*X	X	0	0	X
10	KOSRAE FSM	X	P	P	P	P	P
11	KIRIBATI	0	0	0	0	0	0
12	MALDIVES	0	0	0	0	X	X
13	MARSHALL IS	X	*X	X	P	0	0
14	NAURU	0	0	0	0	0	0
15	N. CALEDONIA	0	0	0	0	0	0
16	NIUE	0	0	0	0	0	0
17	PALAU	X	*X	X	X	X	X
18	PNG	X	*X	X	0	X	X
19	PHILIPPINES	X	**X	X	0	X	X
20	POHNPEI FSM	X	**X	X	0	X	X
21	SAIPAN	X	P	P	P	X	X
22	SOLOMON IS	P	0	0	0	0	0
23	TOKELAU	0	0	0	0	P	X
24	TONGA	0	0	0	0	0	0
25	TRUK FSM	X	0	0	0	X	X
26	TUVALU	P	0	0	0	0	0
27	VANUATU	0	0	0	0	0	0
28	W. SAMOA	P	P	P	0	P	P
29	YAP FSM	X	0	0	0	X	X

COUNTRY HAS
PRODUCED OR
IMPORTED
CLAM SEED
AND PLANTED
ON REEF

15 TOTAL;
3 PENDING

9 HATCHERIES
IN 6
COUNTRIES;
6 PENDING

COUNTRY HAS
PRODUCED,
DISTRIBUTED
AND PLANTED
CLAM SEED
LOCALLY

6 TOTAL;
5 PENDING

COUNTRY HAS
EXPORTED
CLAM SEED

2 TOTAL;
4 PENDING

COUNTRY HAS
PROVIDED
SOME FORM
OF CLAM
MARICULTURE
TRAINING

9 TOTAL;
4 PENDING

RESEARCH
IN PROGRESS

15 COUNTRIES
2 PENDING

LEGEND :

X --ACTIVE
PROGRAM

0 -- NOT
ACTIVE

P -- PENDING
FOR 1988

MMDC CLAM TRAINEES 1984-1987

	TRAINEES	COUNTRY	AFFILIATION	STARTED	FINISHED	NOW ACTIVE?
1	NGIRAMENGIOR	PALAU	MMDC	11/01/83	10/31/84	NO
2	PARTRIDGE K	YAP	MRD	01/19/84	01/19/84	NO
3	MARCUM B	AUSTRALIA	REEF CULTURE	03/15/84	03/18/84	YES
4	STEVENS B	AUSTRALIA	REEF CULTURE	03/15/84	03/18/84	YES
5	DWIONO S	INDONESIA	AMBON INST	03/18/84	03/25/84	NO
6	FAGOLIMUL J	YAP	MRD	04/08/84	04/15/84	YES
7	HENRY M	TRUK	MRD	04/20/84	04/27/84	NO
8	CURREN F	POHNPEI	MRD	08/13/84	06/26/84	YES
9	BELL-COLIN L	NEW GUINEA	UPNG	10/03/84	10/10/84	NO
10	LOPEZ M	PHILIPPINES	UPMARSCI	11/22/84	12/09/84	NO
11	WATSON T	PALAU	MMDC	11/01/84	12/31/87	YES
12	ISAMU T	PALAU	MMDC	11/01/84	12/31/87	YES
13	KILMA N	MARSHALLS	COM. ACTION	01/31/85	04/30/85	NO
14	PHILLIP R	POHNPEI	MRD	05/01/85	06/24/85	YES
15	DAILY M	US HAWAII	CAL STATE U	04/14/85	04/18/85	YES
16	BUSH R	MARSHALLS	COM. ACTION	04/14/85	04/19/85	NO
17	CRAWFORD C	AUSTRALIA	JAMES COOK U	06/12/86	06/19/86	YES
18	CURREN F	POHNPEI	MRD	06/15/85	06/24/85	YES
19	FAGOLIMUL J	YAP	MRD	07/15/85	08/31/85	NO
20	NICHOLAS C	TRUK	MARITIME ATY	08/01/85	09/17/85	NO
21	ETPISON M	PALAU	KOROR STATE	10/15/85	10/25/85	NO
22	NGIRAIBAB N	PALAU	KOROR STATE	10/15/85	10/25/85	NO
23	SOLIS E	PHILIPPINES	SILLIMAN U	12/04/85	12/15/85	YES
24	DAWSON R	AUSTRALIA	GRIFFITH U	12/04/85	12/09/85	YES
25	BUCKLEY R	AM SAMOA	MRD	12/17/85	12/21/85	NO
26	ITANO D	AM SAMOA	MRD	12/17/85	12/21/85	YES
27	THOMFORDE H	PHILIPPINES	UP ILOILO	12/22/85	12/23/85	NO
28	DAVIS OK	MARSHALLS	MIDPAC MARIN	01/17/86	01/21/86	NO
29	NGIRAILMESAN	PALAU	PRIVATE	02/14/86	02/15/86	NO
30	SIGRAH J	KOSRAE	MRD	03/16/86	04/05/86	YES
31	BUCKINGHAM	MARSHALLS	REIMERS INC	03/15/86	03/25/86	NO
32	POLLOI S	PALAU	MELEKIOK ST	03/17/86	03/23/86	YES
33	HOWARD NED	COOK ISLANDS	MIN MAR RES	05/12/86	05/20/86	YES
34	ALDAN DAVE	SAIPAN	FISH WILDLF	07/28/86	08/01/86	YES
35	OTONG ENDAMO	PALAU	KOROR STATE	07/21/86	07/29/86	YES
36	PATRIS THOM	PALAU	LEGISLATURE	07/31/86	07/31/86	NO
37	MOORE, JIM	YAP	PEACE CORPS	04/30/87	09/08/87	YES
38	PRICE, C.	YAP	PEACE CORPS	05/18/87	05/19/87	YES
39	RICE, MIKE	PALAU	EMMAUS HS	07/01/87	08/01/87	YES
40	BELL, LUI	W. SAMOA	MRD	09/07/87	09/21/87	YES
41	IOU, JOHN	YAP	MRD	10/02/87	10/03/87	YES
42	HASTIE, LEE	SCOTLAND	HERIOT-WATT	10/19/87	12/31/87	YES
43	LEDUA, E.	FIJI	FISHERIES DIV	11/09/87	12/07/87	YES
44	CLARK, M.	HAWAII	HIMB	11/09/87	11/20/87	YES
45	MELUOFENUA	TUVALU	FISHERIES DIV	03/07/88	04/07/88	YES
46						
47						
48						*INVOLVED IN
49						GIANT CLAM
50						MARICULTURE
51						OR RESEARCH
52						AS OF 03/88
53						
54						(60% ACTIVE)

MMDC CLAM SHIPMENTS (1984 - 87)

	DATE	DESTINATION	NUMBER SENT	SIZE IN MM	COST IN US\$	VALUE IN US\$	STATUS
1	01/27/84	YAP FSM	1000	84.0	1000.00	1000.00	OK
2	09/07/84	KOROR PALAU	240	95	00.00	240.00	OK
3	09/07/84	KOROR PALAU	260	113	00.00	260.00	OK
4	02/03/85	PHILIPPINES	200	50.0	00.00	200.00	OK
5	02/03/85	PHILIPPINES	20	140.0	00.00	100.00	OK
6	05/23/85	MARSHALLS	1000	73.2	00.00	1000.00	OK
7	06/24/85	POHNPEI FSM	250	79.8	00.00	250.00	OK
8	06/24/85	POHNPEI FSM	250	23.6	1250.00	1250.00	OK
9	07/03/85	MARSHALLS	250	77.2	250.00	250.00	OK
10	07/23/85	FIJI	500	20.4	00.00	00.00	DOA
11	08/03/85	MARSHALLS	250	84.9	250.00	250.00	OK
12	08/20/85	KONA HAWAII	1075	18.8	268.75	268.75	OK
13	08/20/85	KONA HAWAII	675	90.3	675.00	675.00	OK
14	08/20/85	KONA HAWAII	20	187.5	00.00	100.00	OK
15	08/27/85	MARSHALLS	500	88.4	500.00	500.00	OK
16	09/26/85	POHNPEI	500	85.9	00.00	500.00	OK
17	10/02/85	MARSHALLS	500	88.6	500.00	500.00	OK
18	10/10/85	POHNPEI	250	93.2	00.00	250.00	OK
19	11/20/85	KOROR PALAU	1000	97.0	00.00	1000.00	OK
20	11/26/85	MARSHALLS	500	97.2	500.00	500.00	OK
21	12/05/85	COCOS GUAM	100	184.5	00.00	500.00	OK
22	12/10/85	YAP FSM	500	101.4	00.00	500.00	OK
23	12/15/85	PHILIPPINES	200	29.6	00.00	50.00	OK
24	12/17/85	YAP FSM	500	102.3	00.00	500.00	OK
25	03/14/86	KOROR PALAU	500	72.1	00.00	500.00	OK
26	04/29/86	MELEK. PALAU	500	91.4	00.00	500.00	OK
27	05/15/86	TRUK FSM	500	59.4	00.00	500.00	OK
28	05/20/86	COOK ISLANDS	500	57.7	500.00	500.00	OK
29	05/20/86	COOK ISLANDS	500	101.0	500.00	500.00	OK
30	06/17/86	TRUK FSM	500	60.2	00.00	500.00	OK
31	06/29/86	PHILIPPINES	300	27.9	75.00	75.00	OK
32	07/22/86	KOROR PALAU	300	115.0	00.00	300.00	OK
33	07/24/86	KOROR PALAU	440	115.0	00.00	440.00	OK
34	07/29/86	KOROR PALAU	300	72.3	00.00	300.00	OK
35	08/05/86	HONOLULU HI	1000	19.9	250.00	250.00	OK
36	09/04/86	KOSRAE FSM	1000	68.9	00.00	1000.00	OK
37	10/23/86	SAIPAN CNMI	500	65.7	00.00	500.00	OK
38	10/30/86	SAIPAN CNMI	500	62.8	00.00	500.00	OK
39	11/20/86	A. SAMOA	1000	71.7	1000.00	1000.00	OK
40	11/22/86	KYANGL PALAU	200	107.3	00.00	400.00	OK
41	12/09/86	YAP, FSM	1000	94.1	1500.00	1500.00	OK
42	12/16/86	YAP, FSM	1000	95.9	1500.00	1500.00	OK
43	12/23/86	YAP, FSM	1000	95.7	1500.00	1500.00	OK
44	12/23/86	KYANGL PALAU	100	27.2	00.00	25.00	OK
45	12/23/86	KYANGL PALAU	100	23.3	00.00	25.00	OK
46	12/23/86	KOROR PALAU	200	119.6	00.00	400.00	OK
47	12/30/86	YAP, FSM	1000	94.2	1500.00	1500.00	OK
48	01/06/87	YAP, FSM	400	75.8	600.00	600.00	OK
49	01/06/87	YAP, FSM	600	107.5	900.00	900.00	OK
50	01/13/87	YAP, FSM	500	117.5	750.00	750.00	OK
51	01/20/87	YAP, FSM	500	119.3	750.00	750.00	OK
52	01/29/87	TRUK, FSM	1000	72.5	1000.00	1000.00	OK
53	05/14/87	TRUK, FSM	1000	66.9	1000.00	1000.00	DOA
54	08/15/87	KOROR PALAU	200	107.6	00.00	400.00	OK
55	09/17/87	OKINAWA JAP	100	74.5	00.00	150.00	OK
56	11/12/87	AM SAMOA	1400	82.5	2100.00	2100.00	OK
57	11/17/87	AM SAMOA	800	104.9	1200.00	1200.00	OK
58	11/17/87	AM SAMOA	800	95.0	1200.00	1200.00	OK

MMDC CLAM SHIPMENTS (1984 - 87)

	DATE	DESTINATION	NUMBER SENT	SIZE IN MM	COST IN US\$	VALUE IN US\$	STATUS
59	11/20/87	HAWAII	250	29.4	188.00	188.00	OK
60	11/20/87	HAWAII	50	42.9	50.00	50.00	OK
61	11/20/87	HAWAII	50	117.2	75.00	75.00	OK
62	11/20/87	HAWAII	250	15.6	125.00	125.00	OK
63	12/08/87	KONA HAWAII	200	56.4	0.00	200.00	OK
64	12/23/87	SAIPAN CNMI	100	160.0	500.00	500.00	OK
65	01/06/88	SAIPAN CNMI	200	161.0	1000.00	1000.00	OK
66	01/21/88	KONA HAWAII	200	113.00	600.00	600.00	OK
67	01/27/88	SAIPAN CNMI	200	163.00	1000.00	1000.00	OK
68	02/11/88	KONA HAWAII	200	69.3	300.00	300.00	OK
69	02/16/88	TRUK, FSM	1000	54.1	0.00	1000.00	OK
70	03/08/88	KONA HAWAII	147	119.3	441.00	441.00	OK
71	03/08/88	KONA HAWAII	53	63.9	53.00	53.00	OK

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