Ocean nursery systems for scaling-up juvenile sandfish (*Holothuria scabra)* production - ensuring opportunities for small fishers

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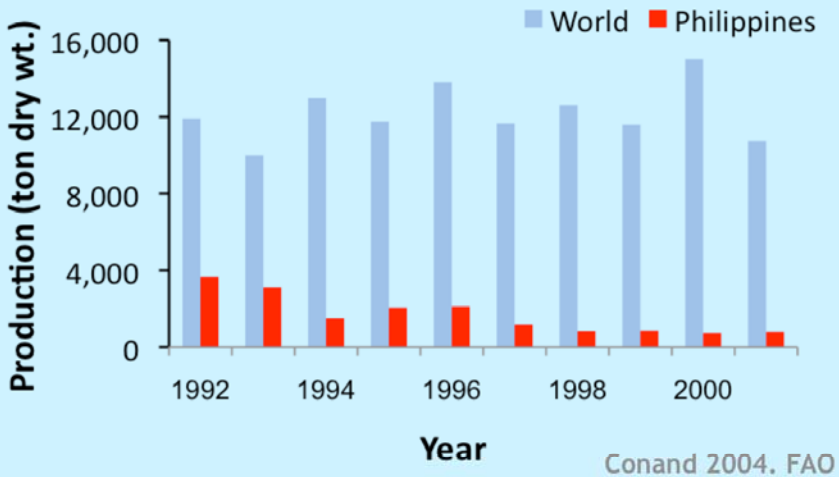
Trepang: Dollar earner

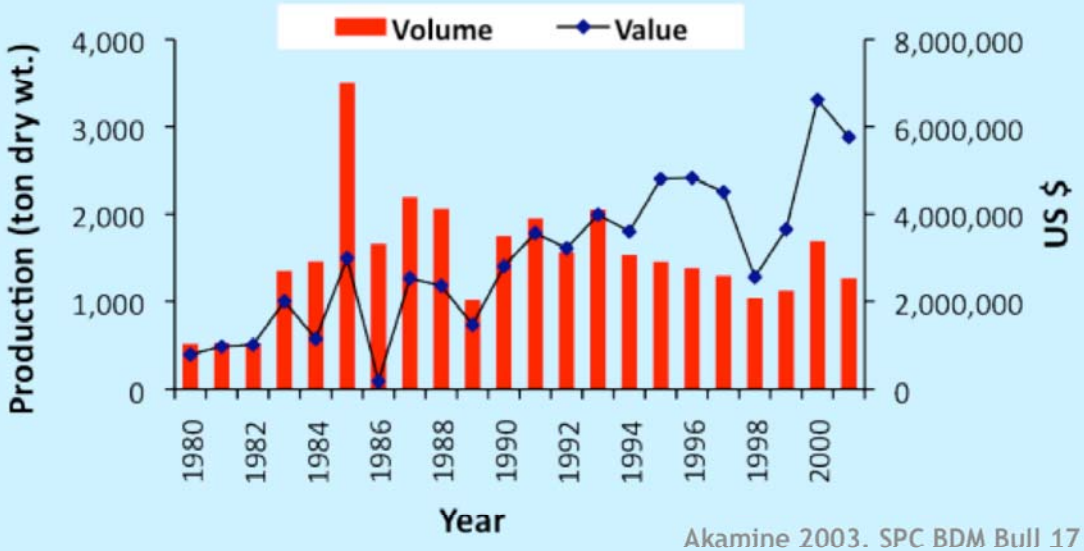
World production (1992-2001)



Conand 2004. FAO

Dried sea cucumber (*trepang*)

Philippine export (1980-2000)



Akamine 2003. SPC BDM Bull 17

Seafood dish & dietary supplements

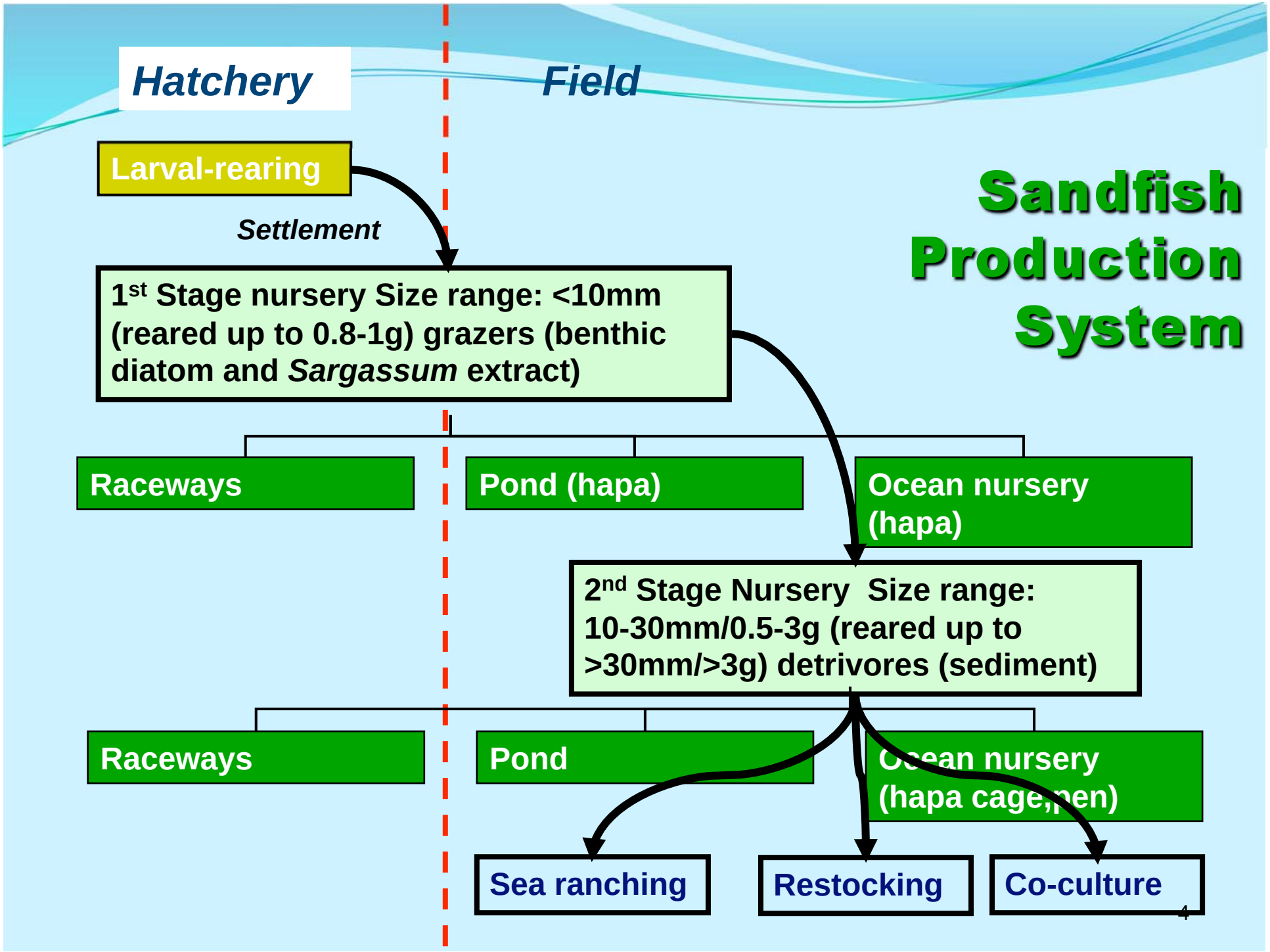
Mass production of *H. scabra* is a challenge

- **Expensive**
  - **hatchery, land-based nursery tanks, marine pond**
  - **large surface areas for juvenile rearing**

OBJECTIVE:

To reduce costs and develop alternative nursery systems to scale-up juvenile production of sandfish.

Sandfish Production System



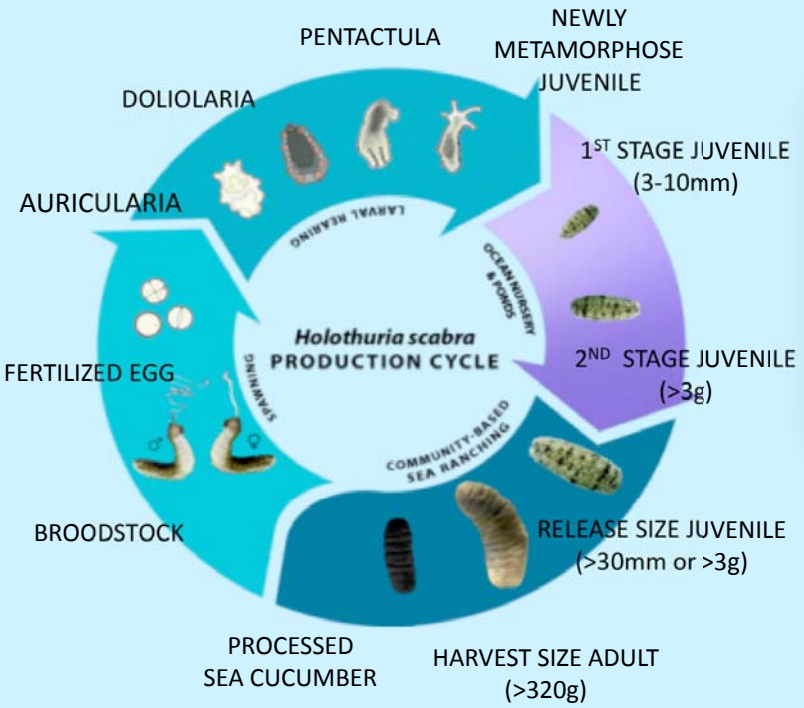
MATERIALS and METHODS

Desiccation (30 mins)

Heat shock (30 mins)

Spirulina bath (1-2 hours)

Spawning induction (Agudo, Worldfish)



Bolinao Marine Laboratory Hatchery Protocols for Sandfish *Holothuria scabra*

Larval rearing: Hatchery Phase

Larval rearing tanks

Larval sampling

Feeding

Bolinao Marine Laboratory Hatchery Protocols

Settlement induction (Duy,RIA3)

Brushing Spirulina in modified settlement plate

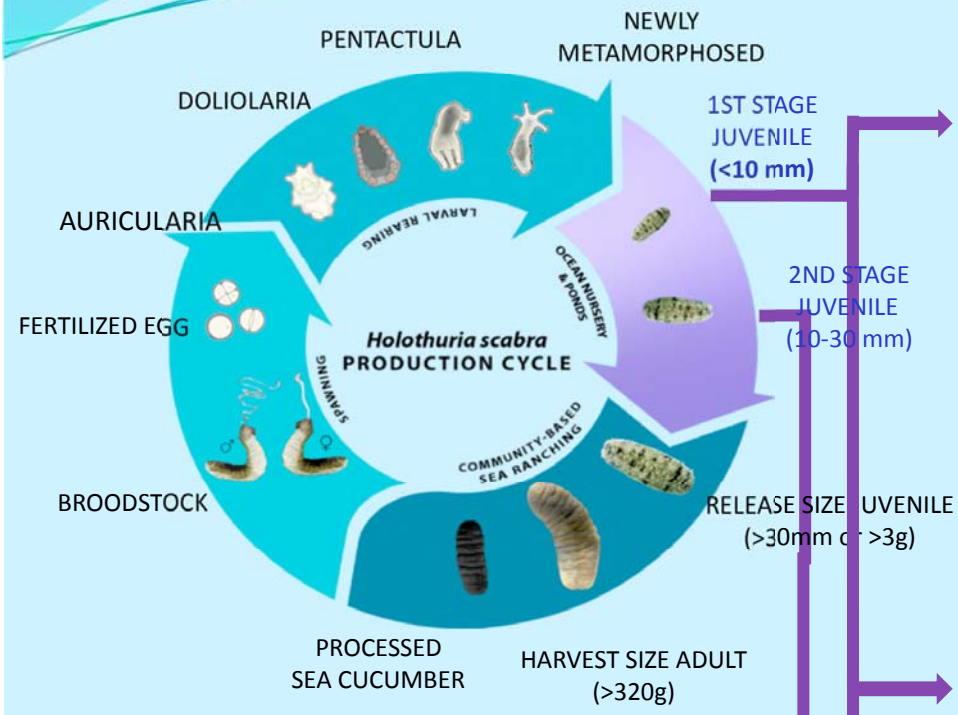
Conditioning of plates & settlement induction

Early juvenile feeding

Supplemental feed: Chaetoceros

Supplemental feed: Sargassum extract

B. Juvenile Production



Sand conditioning experiment

- Treatments: Hatchery tanks (50 juvs/tank)
  - **I. with sand**
  - **II. without sand**
- Duration:
  30 days (Jan– Feb)
- Parameters:
  Growth and survival

Nursery systems

I. Hapa nets in ponds

Adopted from (Pitt & Duy 2004)

Dimension (m) = 2 x 1 x 1
Grazing area (m^2) = 6.8

OCEAN:

II. Floating hapa

Dimension (m) = 2 x 1 x 1
Grazing area (m^2) = 6.8

III. Bottom-set hapa cage

Dimension (m) = 1x 1 x 1
Grazing area (m^2) = 5

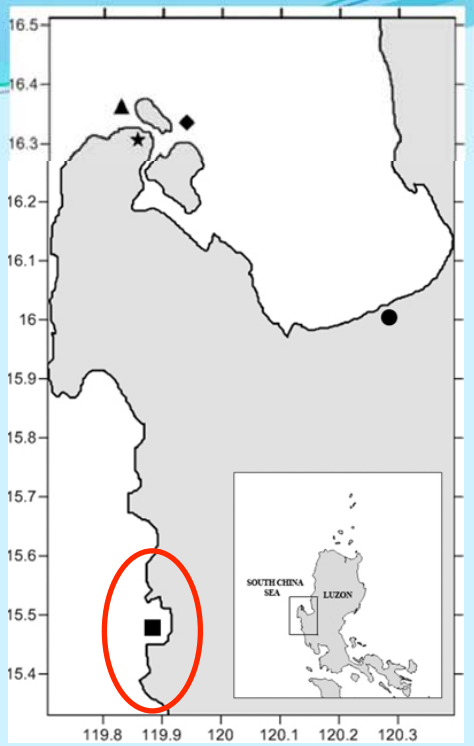
Experimental design:

- Treatments: **Nursery Systems** (with 5 replicates)
- Initial Stocking Density: **150 indivs m^{-2}**
- Duration: **1 month** (Nov. - Dec)
- Parameters: **Growth & survival**

Community grow-out using floating hapas

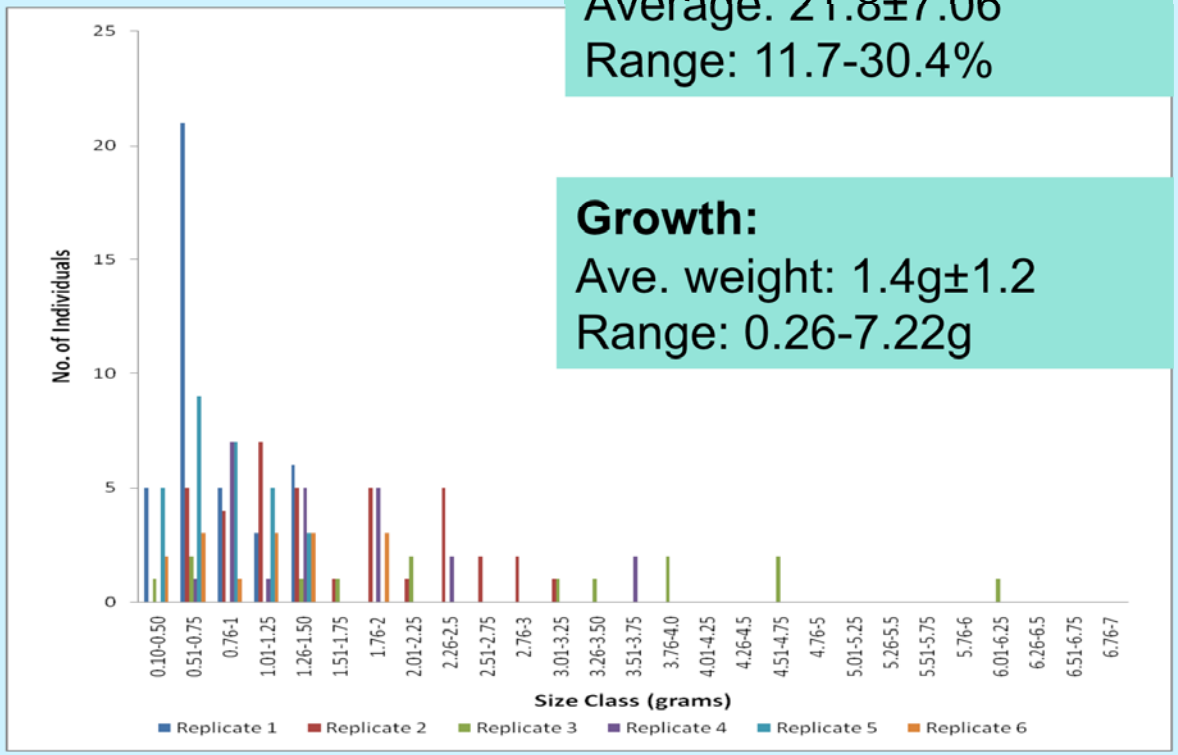
- Six floating hapas were set-up in Masinloc, Zambales (March 2009)

- Community partners were involved in maintaining the set-ups and harvest of the juveniles (60 days)



Survival (%):
Average: 21.8±7.06
Range: 11.7-30.4%

Growth:
Ave. weight: 1.4g±1.2
Range: 0.26-7.22g



JUVENILE PRODUCTION COSTS

PARTICULARS	NURSERY SYSTEMS		
	Hapa Nets in Ponds	Floating hapas	Bottom-set cages
Materials & Operation requirements	Bamboo, hapa net, water pump/ aerator	Bamboo, nylon rope/lines, hapa net, boat/raft	PVC pipes, polyethylene net, nylon rope/lines, bamboo stakes, boat/raft
Dimensions (m)	2 x 1 x 1	2 x 1 x 1	1 x 1 x 1
Nursery system cost (including labor and boat/ vehicle hire)	205 USD	45 USD	80 USD
Price per juvenile	0.45 USD	0.22 USD	0.53 USD

I. Hapa nets in ponds

II. Floating hapa

III. Bottom-set hapa cage

Criteria	Nursery system		
	Hapa nets in ponds	Floating hapas	Bottom-set cages
Growth	+++	++	++
Survivorship	+++	+++	++
Cost of Materials & other inputs	+	+++	++
Maintenance	+	+++	++
Ease of retrieval	+++	++	+
Adaptability (small-scale fishers)	+	+++	++
OTHER CONSIDERATIONS			
Durability of nursery units	++	+	+++
Changes in salinity, temperature, dissolved oxygen	+	++	+++

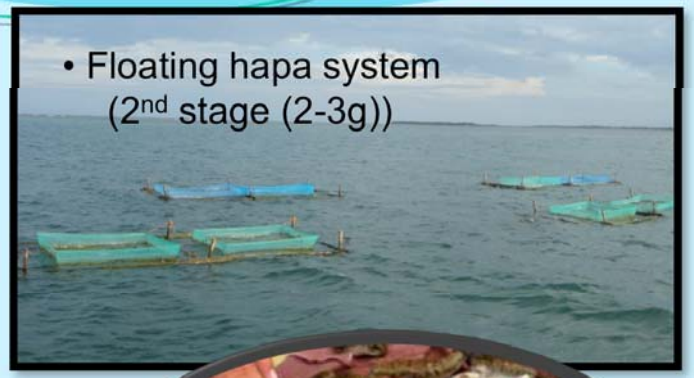
Rating:
+++ most desirable
++
+ least desirable

Scheme for juvenile production of *H. scabra*

• Larval Rearing
• Settlement
• 1st stage (3-10mm)

Hatchery Phase
(30-45 days)

Nursery Phase
(30-60 days)



• Floating hapa system
(2nd stage (2-3g))

Intermediate grow-out
(30 days)

• Bag nets or Sea pens
(Early juveniles (3-30g))

Sea pens and/or Sea ranching
(1yr and 6 months)

•Grow-out to harvestable size
(>320g)

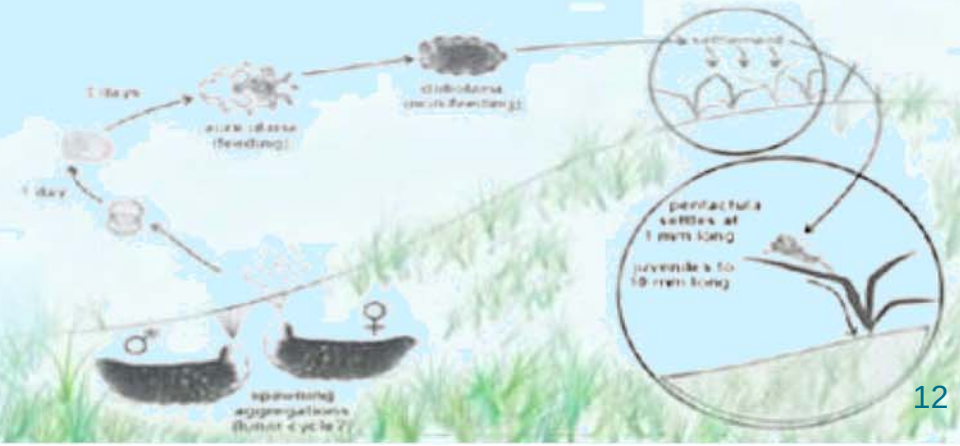
Summary and Conclusions

- **Ocean floating hapas**
  viable alternative nursery system:

  - minimizes hatchery cost by cutting the culture period in the hatchery;

  - easily accessed, adapted and maintained by small-scale fishers;

  - **with intermediate grow-out in sea pens/bagnets a means to scale up production, enhance small fisher involvement in culture and culture –based management initiatives**



Thank you!

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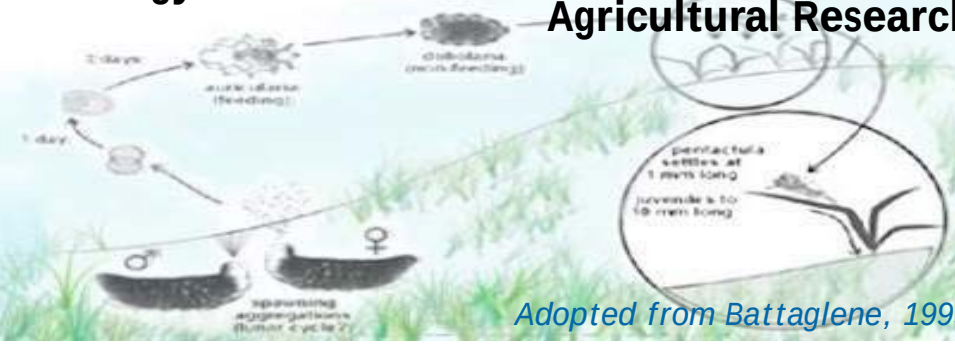

Adopted from Battaglene, 1999