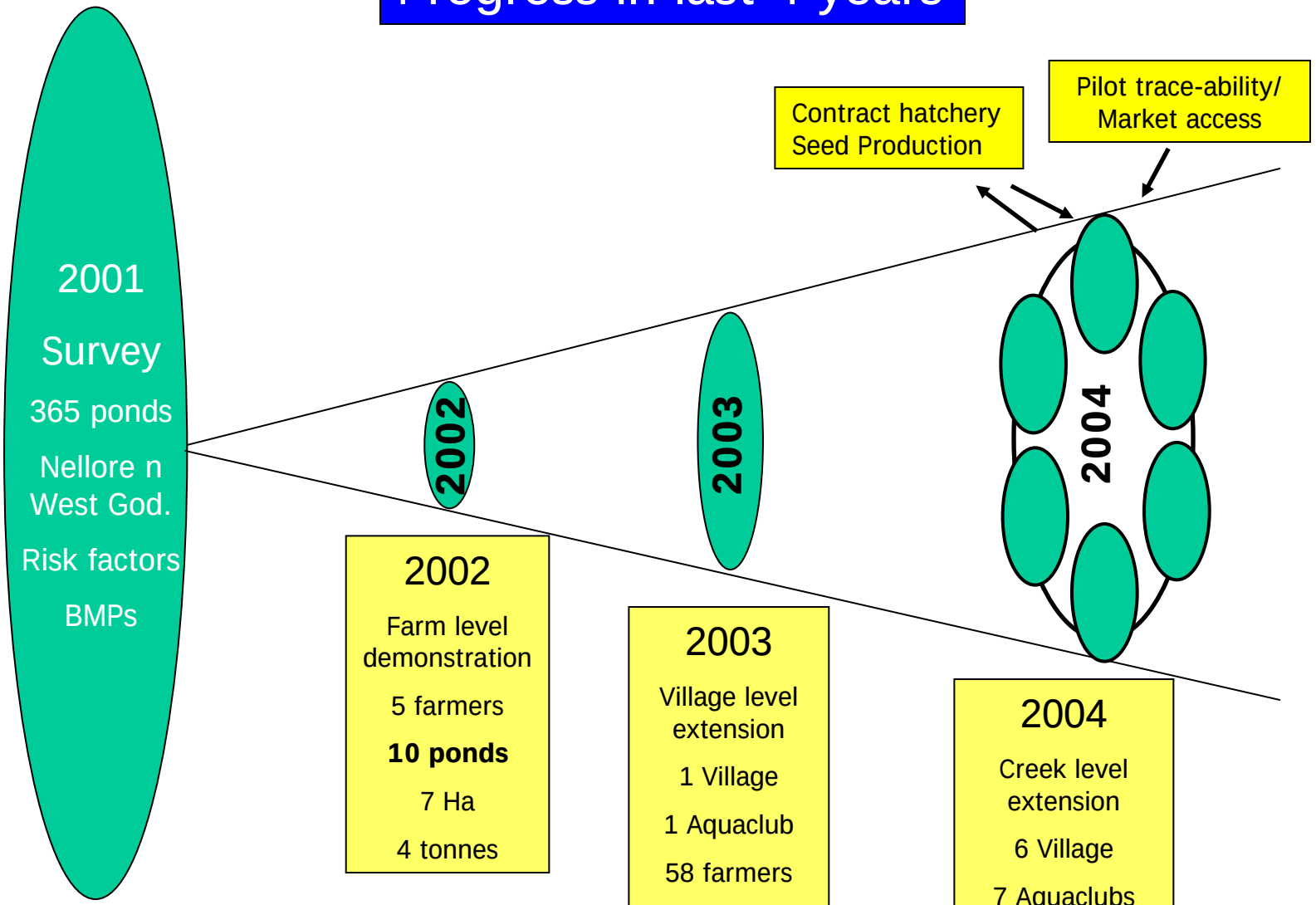
Shrimp Health Management: MPEDA / NACA initiative to put principles into practice among small-scale farmers in India

P.Arun Padiyar, B.Vishnu Bhat, Michael Phillips, and C.V.Mohan

Background

- Shrimp farming area 154,000 ha
  - More than 92% small scale farmers (<2 ha)
  - Around 100,000 farmers
- Shrimp production 116,000 tonnes
- Species cultured: *P.monodon*
- Major issues
  - Viral disease problems (white spot disease since 1994)
  - Loose shell syndrome
- To address health issues, MPEDA/NACA initiated a program in the year 2000

Progress in last 4 years



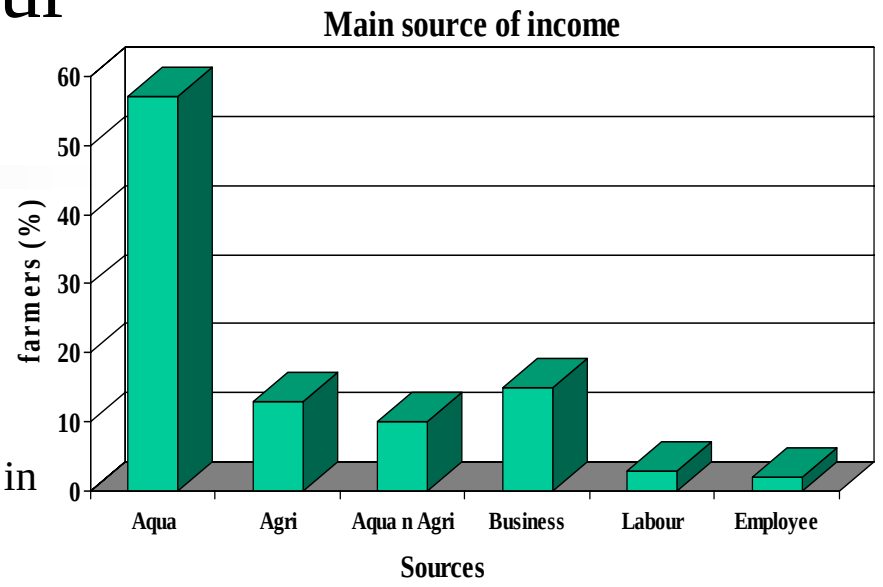
Village Demonstration - 2004

Objectives

- To **promote adoption of Better Management Practices** at cluster level to reduce the risk of disease outbreaks and poor yield (CAPACITY BUILDING)
- To form farmer **"Self-Help Groups" and Network of farmer SHGs (Farmer Associations)** for cooperative approach in managing the shrimp farming activity (ORGANISING THE DISORGANISED SECTOR)
- To **produce shrimps without use of banned chemicals** (ADDRESSING FOOD SAFETY CONCERNS)
- Pilot **trace-ability** system implementation (TO MEET FUTURE MARKET REQUIREMENT)

MPEDA/NACA
Village demonstrations

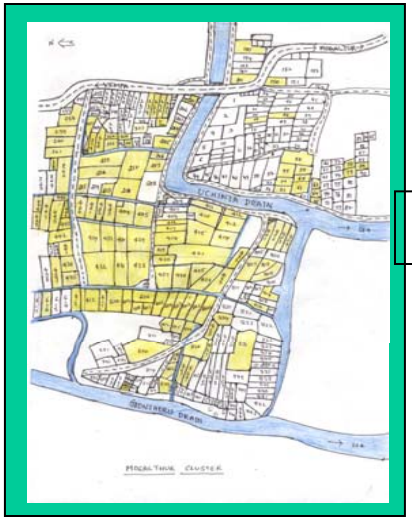
Farming system of Mogalthur and surrounding villages



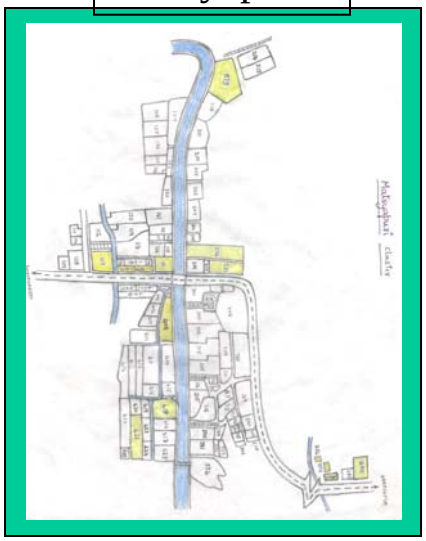
- Small and marginal farmers
  - Owning 2 ponds on an average
  - Each farmer with 1 ha of water spread area
  - Farmers, on an average, have 11 year experience in shrimp farming
- Improved traditional farming system
  - Average stocking density 25,000 shrimp/Ha
  - Low investments (around Rs. 50,000/Ha/crop)
  - Production of around 250 Kg/Ha/crop
- Crop rotation practices
  - Paddy culture
  - Fish / fresh water prawn culture during rainy season.

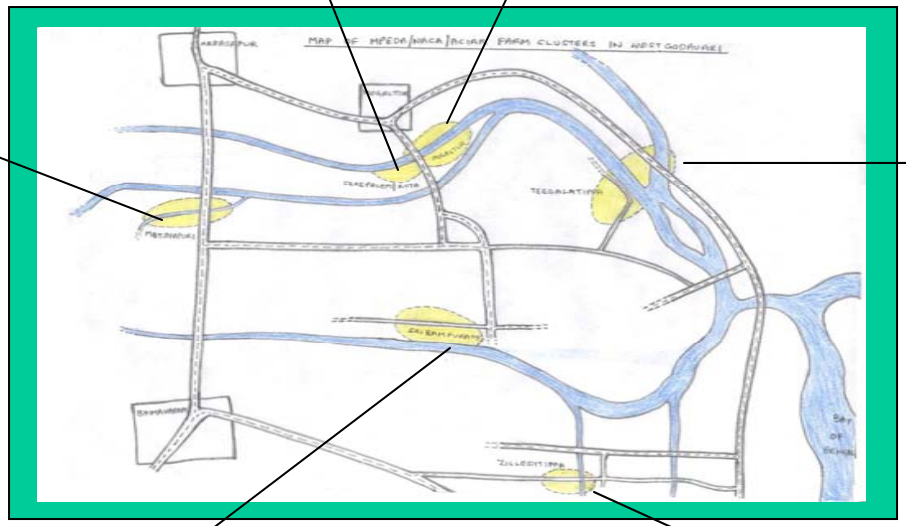
Serepalem

Mogalthur

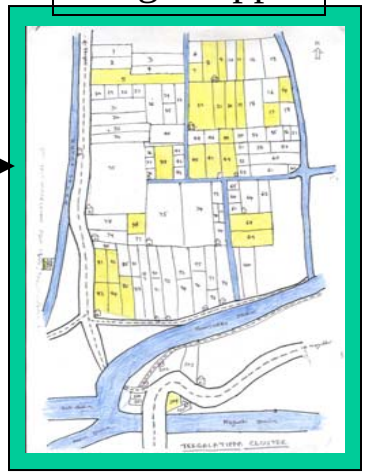


Matsyapuri

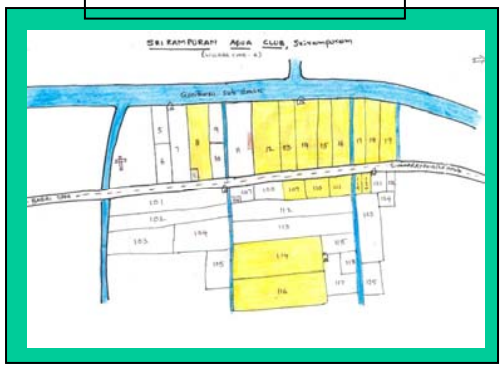




Teegalatippa



Sri Ram Puram



Zilleditippa

Maps of clusters along the creek

Approach

- Facilitation of farmer clubs for better organization
- ‘Farmer to farmer’ contact through weekly meetings
- ‘Farmer to service provider’ contact through weekly meetings
- Direct contact with farmers for on-farm technical support – twice a week/pond
- Field tours for inter-club exchange of information
- Contract hatchery seed production system

Contract hatchery production system

- Farmers and hatchery owners discuss 3 months prior to stocking season
- Agreement formed between farmers and hatchery owner on following items
  - Single brooder spawning and no mixing of nauplii
  - PCR (for WSSV) and MBV testing at different stages
  - No use of banned chemicals
  - Good management and record keeping
  - Access to farmer representatives at any time to observe the tanks
  - Previously agreed price

BMPs

Pond bottom and water preparation

1. Sludge removal and disposal away from pond site
2. Ploughing on wet soil if the sludge has not been removed completely
3. Water filtration using twin bag filters of 60 mesh size
4. Water depth of at least 80 cm at shallowest part of pond
5. Water conditioning for 10-15 days before stocking

BMPs

Seed selection and stocking practices

1. All farmers in club stocking seeds at same time
2. Uniform sized and colored PLs, actively swimming against the water current.
3. Nested PCR negative PLs for White Spot Virus
4. Seed transportation within 6 hrs.
5. Weak PL elimination before stocking using formalin (100 ppm) stress for 15-20 minutes in continuously aerated water.
6. On-farm nursery rearing of PLs for 10-15 days
7. Stocking during 1st week of Feb to 2nd week of March
8. Stocking into green water and avoiding transparent water during stocking

BMPs

Post-stocking and grow-out

1. Use of water reservoirs, and 10-15 days aging before use on grow-out ponds.
2. Regular usage of agricultural lime, especially after water exchange and rain
3. No use of any harmful/banned chemicals like pesticides and antibiotics
4. Use of feed check trays to ensure feeding based on shrimp demand.
5. Feeding across the pond using boat/floating device to avoid local waste accumulation

BMPs

Post-stocking and grow-out

6. Regular removal of Benthic algae.
7. Water exchanges only during critical periods
8. Weekly checking of pond bottom mud for blackish organic waste accumulation and bad smell
9. Regular shrimp health checks, and weekly health and growth monitoring using a cast net
10. Removal and safe disposal of sick or dead shrimp
11. Emergency harvesting after proper decision making
12. No draining or abandoning of disease affected stocks
13. Pond daily management record maintenance

BMP Adoption Rates over last 2 years

Adoption of BMPs (% of ponds)

Pond bottom preparation				
BMP	Non-demo ponds 2004	Demo ponds		
		2004	2003	Change
Sludge removal	66	100	100	-
Sludge disposal away from pond site	80	97	89	+ 8
Ploughing (on wet soil)	13	54	56	- 2

Adoption of BMPs (% of ponds)

Filling & water preparation				
BMP	Non-demo ponds 2004	Demo ponds		
		2004	2003	Change
Water filtration by twin bag filters of 300 micron mesh size	20	52	79	- 27
> 2 ft water at stocking	8	10	7	+ 3
Stocking in green colored water (avoid stocking in transparent water)	30	84	88	- 4

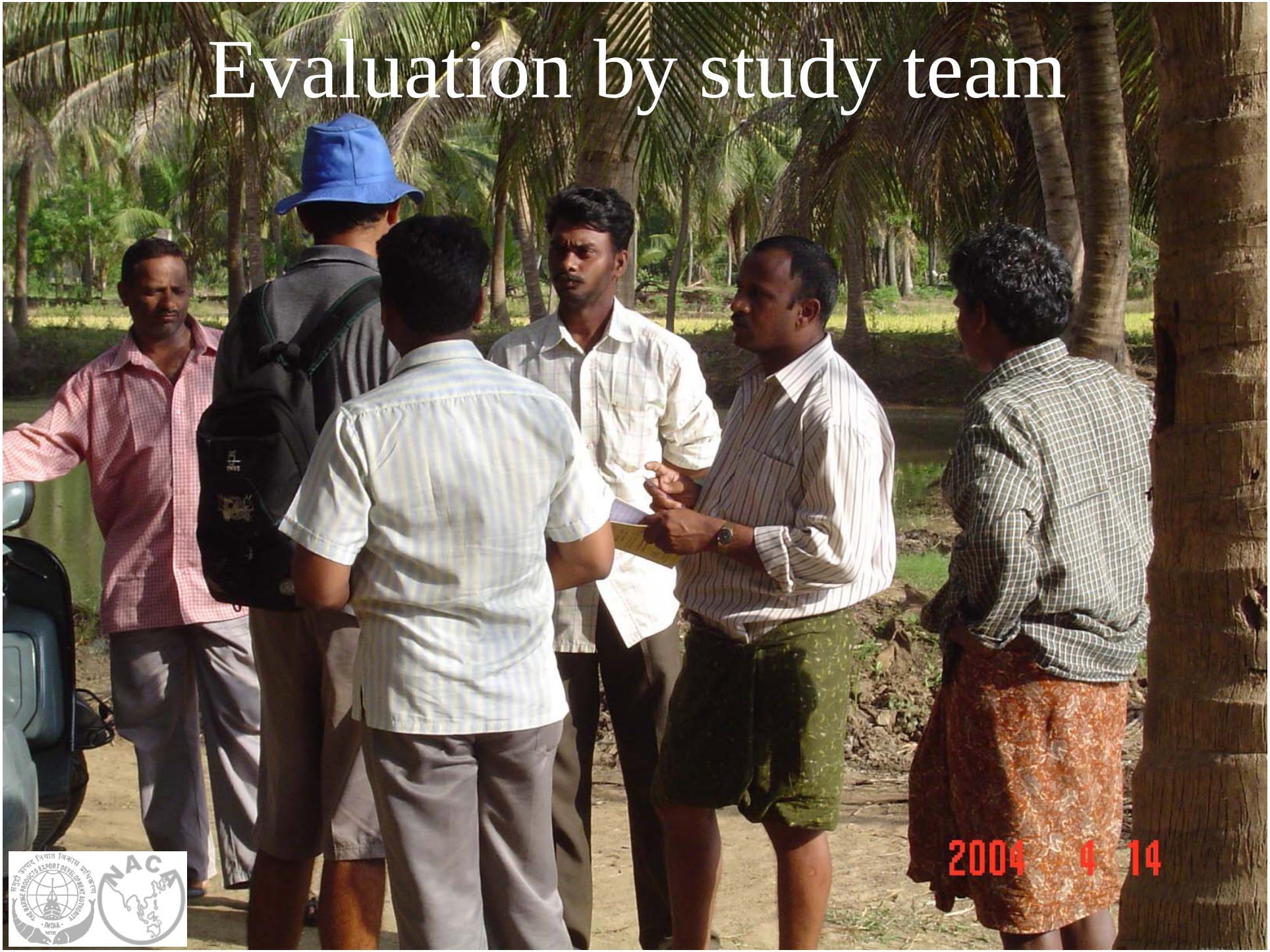
Adoption of BMPs (% of ponds)

Seed selection and stocking time				
BMP	Non-demo ponds 2004	Demo ponds		
		2004	2003	Change
PCR screening of seeds for WSSV	14	92	85	+ 7
On-farm nursery reared seeds	18	95	46	+ 49
Stocking during 1st week of Feb. to 2nd week of Mar.	58	94	47	+ 47

Adoption of BMPs (% of ponds)

Post stocking and grow-out				
BMP	Non-demo ponds 2004	Demo ponds		
		2004	2003	Change
Demand feeding by check trays	22	95	88	+ 7
Regular use of Agri lime	53	100	100	-
No use of banned chemicals - Endosulphan	87	100	100	-

Evaluation by study team



% Ponds in each grade

Grades	Pre- stocking			Post-stocking		
	2003	2004	Change	2003	2004	Change
A	53	34	- 19	24	25	+ 1
B	34	48	+ 14	34	57	+ 23
C	13	18	+ 5	42	18	- 24

Crop outcomes

Crop outcomes (average values) during 2004: Demo Vs Non-demo ponds

Outcomes	Demo ponds		
	Demo	Non-demo	Improvement
Planned harvest (%)	44	30	+ 14
Harvests due to shrimp mortalities (%)	32	40	+ 8
Crop duration (Days)	104	91	+ 13
Production (Kg/Ha)	323	243	+ 80
Mean body weight (g)	25	16.5	+ 8.5
Survival (%)	60	39	+ 21

- Increased yield with decreased stocking densities
  - Average stocking density in demo ponds was 9500 seed/ha lower compared to non-demo ponds (in demo it was 20500/ha, in non-demo it was 30000/ha)

Crop outcomes (average values) in demo ponds: 2003 Vs 2004

Outcomes	Demo ponds		
	2004	2003	Improvement
Planned harvest (%)	44	18	+ 26
Harvests due to shrimp mortalities (%)	32	82	+ 50
Crop duration (Days)	104	87	+ 17
Production (Kg/Ha)	323	315	+ 8
Mean body weight (g)	25	18	+ 7
Survival (%)	60	58	+ 2

- Increased yield with decreased stocking densities
  - Average stocking density decreased by 6500 seed/ha in 2004 (in 2003 it was 27000/ha, in 2004 it was 20500/ha)

Pre-stocking performance grades and Crop outcomes

Grades	Kg/Ha	Survival rate (%)	Average count	FCR	Stocking densities (seed/ha)
A	378	65	41	1.7	23,500
B	288	60	39	2	18,500
C	273	52	39	2	21,000

Post-stocking performance grades and Crop outcomes

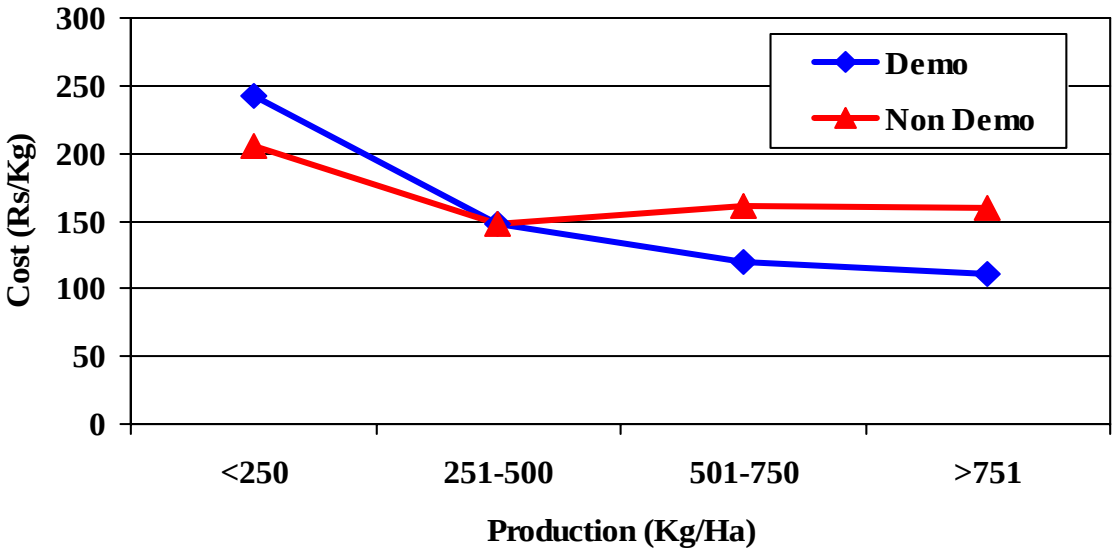
Grades	Kg/Ha	Survival rate (%)	Average count	FCR	Stocking densities (seed/ha)
A	495	81	38	1.6	22,500
B	283	59	39	1.9	19,500
C	168	33	43	2.3	21,500

Economics:
Demo Vs Non-demo ponds

Average values	Demo	Non-demo
Cost of production/Ha	48,900	44,000
Revenue/Ha	64,300	44,900
Profit margin Rs/Ha	15400	900
Ponds (%) with profit	62	47

Cost of Production (Rs/Kg)

Production category (Kg/ha)	Cost of Production (Rs/Kg)		
	Demo	Non-demo	Difference
< 250	242	205	+ 37
251-500	148	148	0
501-750	119	161	- 42
>750	111	159	- 48
Average cost	176	181	- 5



Cost of Production (Rs/Kg)

Activity	Demo	Non-demo	Difference
Sludge removal	18	12	+ 6
Initial water filling	6	6	0
Pre-stocking	***24***	***18***	***+ 6***
Seed	***35***	***40***	***- 5***
Feed	65	82	- 17
Agri lime	9	3	+ 6
Water exchange	21	25	- 4
Post-stocking	***97***	***113***	***- 16***

In demo ponds compared to non-demo ponds

Savings from

- Seed – 5 Rs lesser/kg
- Feed - 17 Rs/Kg
- Water exchange - 4 Rs/Kg
- Chemicals – 3 Rs/kg

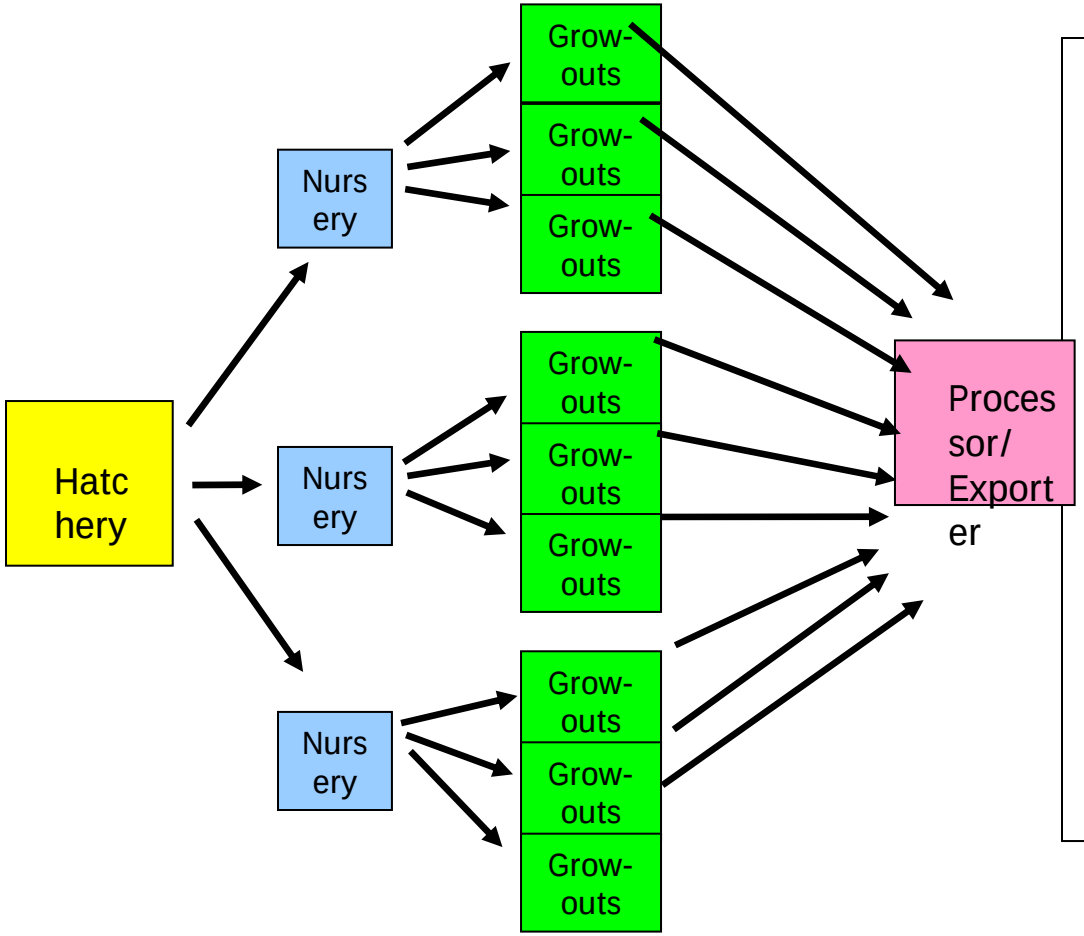
More expenditure on

- Sludge removal - 6 Rs more/Kg
- Agri lime - 6 Rs/Kg

Benefits to the farmers

- Through Aquaclub formation and follow up of BMPs farmers can achieve
  - Lowered risk of disease outbreaks
  - Better production
  - Better quality inputs for lower/justifiable prices
    - Seed
    - Agri lime
  - Increased profits
  - Better quality of shrimps
  - Complete trace-ability till farm gate to meet the export demands

Trace-ability system implementation - trial



- Each harvest at farm gate is given with unique Identity number
- For example id 1827 34 17 means
  - Grow-out pond id - 1827
  - Nursery id – 34
  - Hatchery tank id. 17
- Cluster Map is used for this numbering purpose
- Management record maintained in hatchery, nurseries and ponds – developed the computer database
- But difficulty faced in bringing the farmers and exporters together to follow-up trace-ability system and market the club material

2005 Ongoing program

- Consolidation of the past work and expansion to more farming areas in Andhra Pradesh
  - 16 aquaclubs in 28 villages
  - 556 farmers (935 ponds of 1168 acres).
- Expansion to other states
  - Karnataka, Orissa, Tamil Nadu and Gujarat

Sustaining the Process

- MPEDA is working towards
  - Institutionalization of aquaclubs as aquaculture societies
  - Establishing a separate technical extension agency to sustain the process of BMP promotion and adoption

Thank You