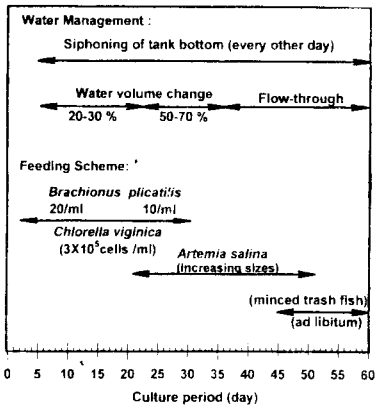
SEAFDEC/AQD's R&D on grouper

By **M Castaños**

Aquaculture in the long term can not really depend on seed supply from the wild because this supply is highly seasonal and erratic; hence, the efforts being made to establish hatchery techniques.

For the grouper *Epinephelus coioides,* SEAFDEC / AQD has made significant strides in R&D in the last ten years. It has established a working technology for grouper hatchery although there are still a few kinks to be ironed out. AQD researcher Marietta Duray has worked out the feeding and water management protocol in rearing grouper larvae as shown below.



cf. Aquaculture 150 (1997): 63-76

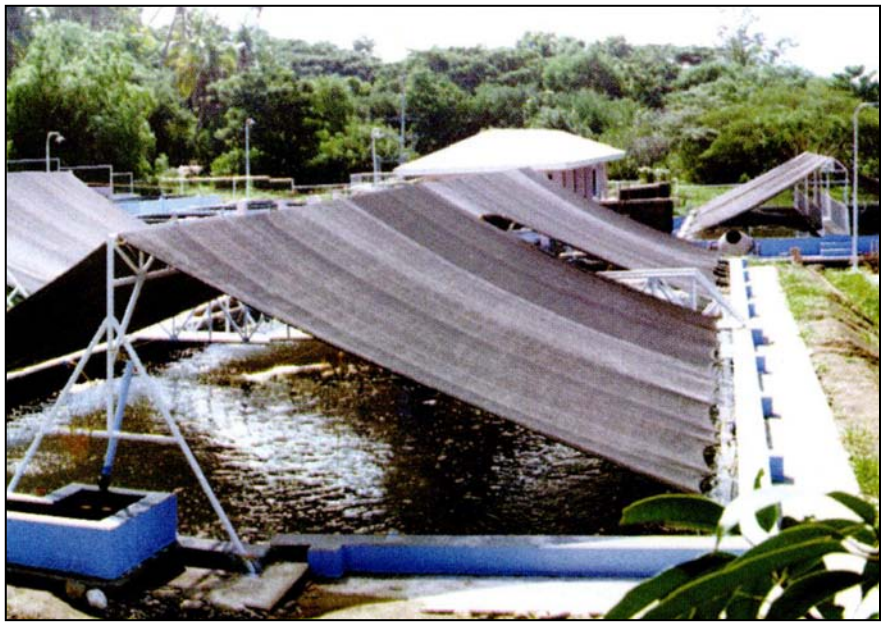
A stocking density of 20 larvae per liter of seawater is recommended. In trials (6-8 runs), survival rate using this scheme was about 20% on Days 0-24, and 16% on Days 25- 60. Day 0 larvae measured 1.6 mm, Day 24 about 11 mm and Day 60 between 51-65 mm.

Ms. Duray noted that it is better to use large tanks (>3 tons) and water salinity of 24 ppt. It is also better to feed small-sized *Brachionus* (a screen may be used to select only less than 90 µm rotifers) during the first feeding period because the mouth of newly hatched grouper is small and grouper can not yet go after bigger prey.

Grouper juveniles produced from AQD's fish hatcheries

SEAFDEC/AQD's research milestones for the grouper *Epinephelus coioides*

YEAR	RESEARCH ACCOMPLISHMENT
1988	broodstocks raised in floating cages and concrete tanks
1989	hormonal sex inversion of females to males
1990	maturation and year-round spawning and larval rearing
1994	completion of the grouper life cycle in captivity, intensive hatchery techniques, fry production
1995	sex-inversed males in natural spawning
1996	improved larval survival by use of copepod nauplii
1997	larval metamorphosis advanced by thyroid hormones



The Integrated Fish Broodstock - Hatchery Demonstration Complex where grouper are held. At present, the complex and the netcages at AQD's station in Igang hold more than 100 grouper broodstock

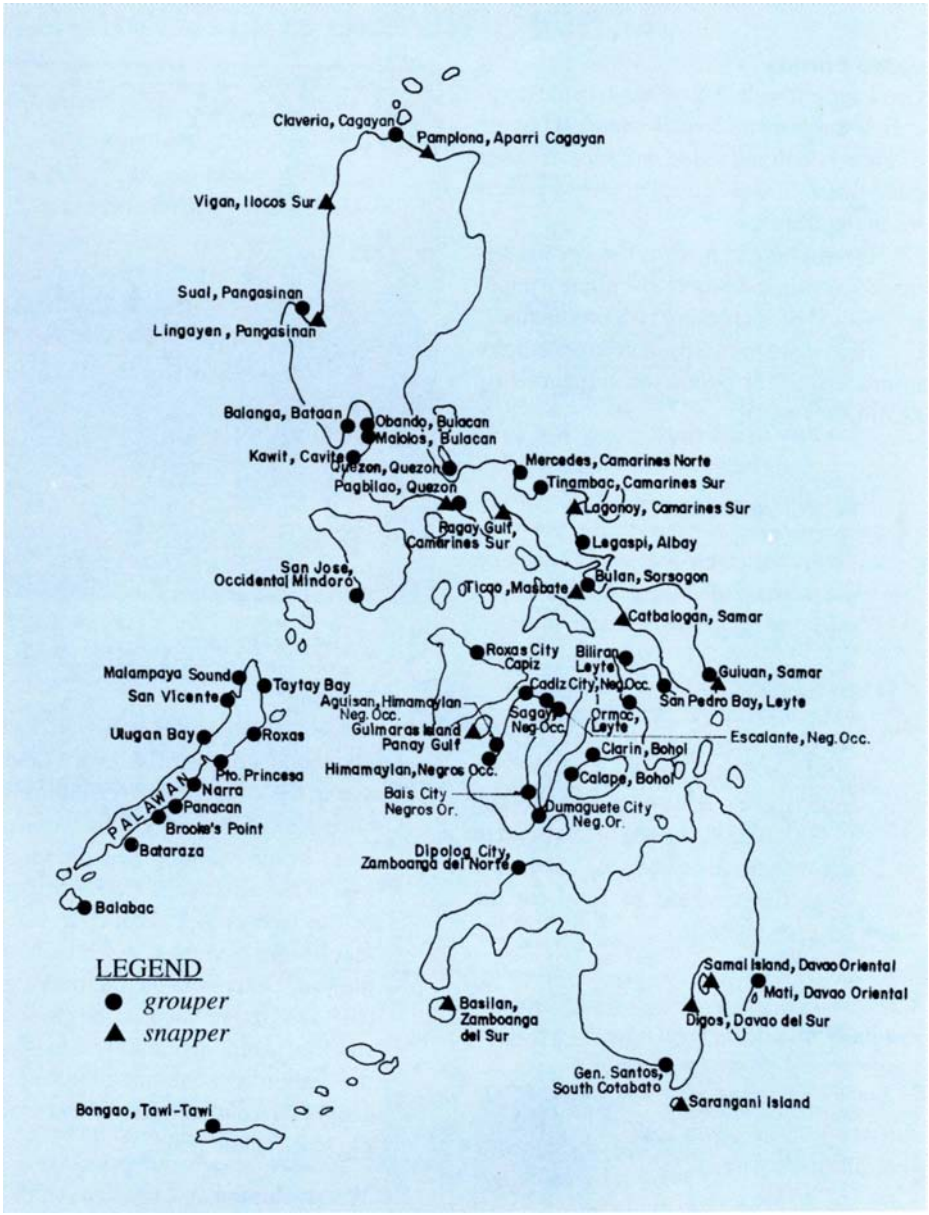
After the hatchery protocol has been worked out, AQD researchers are studying ways to refine it and increase grouper survival so that entrepreneurs can get into the hatchery business.

The source of eggs or newly hatched larvae reared in the hatchery is usually captive broodstock. AQD has around 100 grouper breeders sourced from the wild in 1988 to early 1990.

According to AQD researcher Joebert Toledo, the grouper spontaneously spawn year-round (except in May) in concrete tanks and from July to October in floating netcages. A 5-kg female grouper can produce between 2.3-3.9 million eggs per month.

Mr. Toledo noted that of the eggs produced, 72-89% were fertilized; and of the fertilized eggs, 67-88% hatched into larvae. These figures can still be improved. For one, AQD researchers are studying broodstock nutrition as it relates to reproductive performance. Several other studies are on-going.

Known sources of grouper and snapper fry / fingerlings in the Philippines



RECENTLY PUBLISHED WORK ON GROUPER BY SEAFDEC / AQD

Baliao DD, M de los Santos, EM Rodriguez and RB Ticar. 1998. Grouper culture in brackishwater ponds. Aquaculture Extension Manual No. 24. SEAFDEC/AQD. 17 pp

de Jesus EGT, JD Toledo and MS Simpas. 1998. Thyroid hormones promote early metamorphosis in grouper *(Epinephelus coioides)* larvae. General and Comparative Endocrinology 112: 10-16

Doi M, JD Toledo, MSN Golez, M de los Santos and A Ohno. 1997. Preliminary investigation of feeding performance of larvae of early red-spotted grouper, *Epinephelus coioides,* reared with mixed zooplankton. Hydrobiologia 358: 259-263

Duray MN, CB Estudillo and LG Alpasan. 1996. The effect of background color and rotifer density on rotifer intake, growth and survival of the grouper (*Epinephelus suillus*) larvae. Aquaculture 146: 217-224

Duray MN, CB Estudillo and LG Alpasan. 1997. Larval rearing of the grouper *Epinephelus suillus,* under laboratory conditions. Aquaculture 150: 63-76

Duray MN. 1994. Daily rates of ingestion on rotifers and *Artemia* nauplii by laboratory-reared grouper larvae of *Epinephelus suillus.* Philippine Scientist 31:32-41

Lavilla-Pitogo CR, AR Castillo and MC de la Cruz. 1992. Occurrence of Vibrio sp. infection in grouper, *Epinephelus suillus.* Journal of Applied Ichthyology 8: 175-179

Quinitio GF, NB Caberoy and DM Reyes Jr. 1997. Induction of sex change in female *Epinephelus coioides* by social control. The

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In general, Cambodia does not have mangrove management / conservation activities such as inventory and reforestation. But there are already many efforts and attempts by non-government organizations and international organizations to collaborate with the government to improve environmental protection.

Myanmar

U Tin Win
Department of Fisheries

Myanmar has extensive mangrove forests, 382,032 ha, distributed in Ayeyarwady (46.4%), Tanintharyi (36.7%) and Rakhine (16.9%). But there has been substantial reduction of forest cover in all areas over the years mainly attributed to the demand for fuelwood / charcoal production.

Neither intensive nor semi-intensive shrimp farming has developed, and Myanmar is fortunate to have learned from the mistakes of shrimp producing countries like Thailand and the Philippines. But there are plans to develop 40,000 ha of ponds for semi-intensive shrimp culture because the government considers shrimp a potentially large generator of foreign exchange (US$400-500 million).

As yet, shrimp farmers still practice the traditional, extensive method. About 12,000 ha are operated in Rakhine state, near the border of Bangladesh. The yields are very low, about 100 kg per ha per year. Fish culture of seabass, grouper, milkfish and mullet is still in pilot-scale.

At present, there is no well-developed arrangement for managing the country's coastal and marine zone. Much of Myanmar's coastline is sparsely populated and features natural ecosystems which have suffered relatively little exploitation except in Ayeyarwady Delta.

In the future, integrated coastal zone management approaches will be considered in establishing the policy, planning and regulatory framework to ensure that the coastal zone is managed sustainably.

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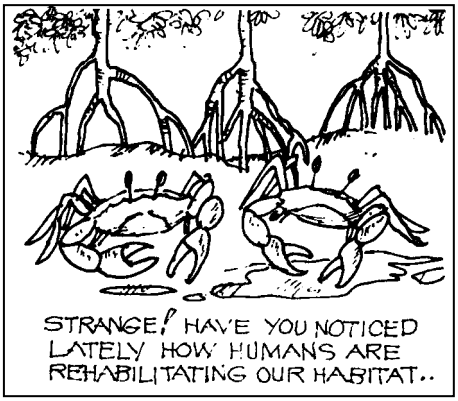
logue were: Hon. Jed Tirol, Tangalan mayor; Hon. Pedro Garcia, Ibajay mayor; Norberto Soliva, Bugtong Bato barangay captain; Cesar Ureta, Aklan BFAR provincial director; Levi Lahaylahay, provincial planning and development officer and the Aklan governor's representative.

Local and national media based in Aklan were also present. ###



Quarto / MAP... from p 11

small scale, that aren't using lots of inputs, for instance, chemical inputs and antibiotics, pesticides and don't require the clearing of mangroves to exist and silvofisheries. These have proven themselves in different countries, for instance, Indonesia, Malaysia. The local people can afford to actually implement these systems in their areas. These are what we're looking for. The kind of solution to help the local communities, basically not replace their livelihood.

Any final, encouraging note on mangroves?

I do think if we replant mangroves and conserve our mangrove forests, we'll find enough fish in our oceans to feed the increasing populations. If we properly manage our fishing techniques, and help preserve and get back the ocean's health, the ocean will be the best place to raise fish for the future. And aquaculture will be used as a supplement, not as a replacement for ocean production of fish products for the future. ###

Grouper R&D ... from p 21

Israeli Journal of Aquaculture - Bamidgeh 49: 77-83

Tan-Fermin JD. 1992. Withdrawal of exogenous 17a methyltestosterone causes reversal of sex-inversed male grouper *Epinephelus suillus* (Valenciennes). Philippine Scientist 29: 33-39

Tan-Fermin JD, Garcia LMB and AR Castillo Jr. 1994. Induction of sex inversion in juvenile grouper *Epinephelus suillus* (Valenciennes) by injection of 17a methyltestosterone. Jap. J. Ichthyol. 40: 413-420

Toledo JD, A Nagai and D Javellana. 1993. Successive spawning of grouper, *Epinephelus suillus* (Valenciennes), in tank and a floating net cage. Aquaculture 115: 365-367

Toledo JD, SN Golez, M Doi and A Ohno. 1997. Food selection of early grouper, *Epinephelus coioides,* larvae reared by the semi-intensive method. Suisanzoshoku 3: 327-337

Toledo JD, SN Golez, M Doi, RS Bravo and S Hara. 1996. Preliminary studies on the rearing of the red-spotted grouper, *Epinephelus coioides* larvae using copepod nauplii as initial food. UPV J. Nat. Sci. 1: 119-129

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