

GUIDING PRINCIPLES FOR PROMOTING
AQUACULTURE IN AFRICA:
benchmarks for sustainable development

Copies of FAO publications can be requested from:
Sales and Marketing Group
Information Division
FAO
Viale delle Terme di Caracalla
00100 Rome, Italy
E-mail: publications-sales@fao.org
Fax: (+39) 06 57053360

GUIDING PRINCIPLES FOR PROMOTING
AQUACULTURE IN AFRICA:
benchmarks for sustainable development

by

John Moehl

Regional Aquaculture Officer
FAO Regional Office for Africa

Randall Brummett

Senior Aquaculture Scientist
WorldFish Center

Mulonda Kalende Boniface

Aquaculture Specialist/UNV
FAO Regional Office for Africa

and

André Coche

Senior Fishery Resources Officer (Aquaculture, Retired)
FAO Fisheries Department

The mention or omission of specific companies, their products or brand names does not imply any endorsement or judgement by the Food and Agriculture Organization of the United Nations.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to the Chief, Electronic Publishing Policy and Support Branch, Information Division, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy or by e-mail to copyright@fao.org

© FAO 2006

PREPARATION OF THIS DOCUMENT

The FAO Inland Water Resources and Aquaculture Service, through the Fisheries Department Group of the FAO Regional Office for Africa, in collaboration with the WorldFish Centre, has assembled in the present document more than three decades of field-level experiences which have been distilled and reviewed to elaborate guidelines for the future development of the aquaculture sub-sector in Africa.

This document is not intended to be a work of scientific research, but rather the net outcome of lengthy processes analysing what has and has not worked as many development partners have devoted millions of dollars and person-hours to the promotion of aquaculture in Africa.

This document is targeted to general aquaculture developmentalists and would-be investors. It attempts to put the sub-sector in a historical perspective to avoid falling into earlier pitfalls which may be unseen due to recurring bouts of loss of institutional memory. Using this historical angle, it reviews successes and failures and extrapolates to a list of lessons learnt. These messages are then used as the foundation of a process for elaborating national aquaculture strategic frameworks.

The document was prepared by Dr John Moehl, Regional Aquaculture Officer, FAO Regional Office for Africa, Mr Mulonda Kalende Boniface, Aquaculture Specialist/UNV, FAO Regional Office for Africa, Dr André Coche, former FAO Senior Fishery Resources Officer (Aquaculture), and Dr Randall Brummett, Senior Aquaculture Scientist, WorldFish Centre, Yaoundé, Cameroon.

ACKNOWLEDGEMENTS

The authors wish to first and foremost thank African aquaculturists for their remarkable energies devoted to establishing aquaculture enterprises for the benefits of their families. These intrepid pioneers have stayed the course in spite of often massive obstacles. As aquaculture in Africa is now coming of age and entering into a new phase of growth and investment, without the tireless efforts of these early farmers, the sub-sector would still be stuck in the quagmire of the donor-dependant seventies. We would also like to thank Dr Les Torans and Mr Henk van der Mheen whose eminent texts have been summarised in the appendices of the document as well as Dr George Chizyuka from the Agriculture Group of the FAO Regional Office for Africa who served as outside reader.

PREFACE

In August, 2003, *The Economist* wrote about “The promise of a blue revolution: how aquaculture might meet most of the world’s demand for fish without ruining the environment”¹. Two years later, the New Partnership for Africa’s Development (NEPAD) recognised “growing opportunities and emerging successes of aquaculture development in the region”. Aquaculture in Africa seems perched on the verge of a new era when high expectations can be matched with appropriate technologies and best practices to be able to put food on the table and money in the pocket. Aquaculture seems to have real potential and be able to realistically contribute to Africa’s urgent need for significantly enhanced economic growth and food security.

This current situation is a long way from the prognosis given by FAOs *Aquaculture Planning In Africa – Report Of The First Regional Workshop On Aquaculture, 2-17 July 1975*, when it was stated: “failures of some of the ill-conceived programmes during the early part of the century have continued to remain a major constraint in convincing the farmers and investors of the economic viability of aquaculture”. The Workshop noted that aquaculture: “should be organised either as a government subsidised food production industry to feed the poor, like agriculture or even fishing in many countries of the world, or in the alternative as an economically viable industry that can make substantial contributions to the overall food production, economy and employment situation in the country”².

Today, the option of supporting a “government subsidised industry” is a non-starter. Aquaculture is a business and must be promoted and managed as such.

It is imperative for us to take new and innovative approaches to aquaculture development if the current Blue Revolution is to succeed. We must shake off the remnants of the “state-does-it-all” approach and establish mechanisms and procedures which facilitate private-sector-led, technically sound, economically profitable, socially acceptable and environmentally sustainable national and regional aquaculture programmes.

The present document looks back at those plush days of the 70s when donor-led aquaculture programmes abounded in Africa. It extracts from these a clear suite of lessons which should guide our future aquaculture development efforts. We must heed these lessons, we must reform and adjust. The State has a key role as a facilitator and monitor. But the business of production, be it fish for the table or fingerlings for the pond, is the business of business and should be soundly put in the hands of the private sector with firm and appropriate public support.

The future is promising and holds the best rewards for those with the foresight to change for the better.

¹ *The Economist*. London: August 9, 2003. Vol. 368, Iss. 8336; pg. 20.

² *Aquaculture Planning in Africa, Report of the First Regional Workshop on Aquaculture Planning in Africa, Accra, Ghana, 2-17 July 1975, Aquaculture Development and Coordination Programme, FAO/UNDP, Rome, September 1975. pg. 1-3.*

EXECUTIVE SUMMARY

Participants in the FAO 1999 *Africa Regional Aquaculture Review*³ were presented with a set of questions which were to be answered through the preview process:

- ✿ How much government support is enough?
- ✿ How can privatisation be facilitated?
- ✿ How can aquaculture be effectively incorporated into unified extension services?
- ✿ Should extension focus only on high priority areas?
- ✿ How can farmers receive reliable and acceptable supplies of seed and feed?
- ✿ How can the Region's training and manpower development needs be best met?
- ✿ What technologies should be promoted and how?
- ✿ How can research and extension be linked?
- ✿ How can research be re-oriented to better meet producers' needs and benefit from better information networks?

While the 1999 Review attempted to answer these questions, the operating environment seven years ago was quite different from today. Although viable aqua-businesses were only a few years away, much of the focus at the end of the last millennium was still on smallholder integrated fish farming for improved livelihoods for the household.

There is now a clear need to move beyond subsistence aquaculture and to deal with aquaculture as a business; be it a micro-, small-, medium-, or industrial-scale enterprises. This change in focus requires a shift in approach for all stakeholders. The roles and responsibilities of the public and private sectors must change significantly. Governments need to divest expensive infrastructure and undeliverable services while establishing ways and means to control quality and impact. The private sector, at all levels, needs to assume responsibilities for production of foodstuffs as well as production inputs (e.g., feed and seed). Capital will be necessary for financially viable firms and workable mechanisms for credit procurement need to be identified and implemented.

Cutting across the redefined roles of stakeholders is the issue of information in terms of quality, appropriateness, accessibility and cost. Extension is one of many information channels that are essential to the growth and monitoring of the sub-sector; but these are channels that are proving quite difficult to put in place in a satisfactory and sustainable way.

Producers themselves will need to assume progressively more responsibility for all functions including obtaining prerequisite information as well as producing quality products. Conventional wisdom places much credence on producer associations of one form or another. While it is clear that producers must work

³ Africa Regional Aquaculture Review, Proceedings of a Workshop held in Accra, Ghana, 22-24 September 1999. CIFA Occasional Paper No. 24. Accra, 2000.

together and organise their specific functions in the overall sub-sector, mechanisms for cohesive and mutually beneficial producer groups at farm level need to be refined. Local level assemblages need to be linked to national or supra-national producer networks with adequate political voice to be able to lobby as the sub-sector evolves.

Marketing has been always formally acknowledged as a critical element of any aquaculture programme. However, in practice it has often been ignored or misinterpreted. Nevertheless, it is critical and must be carefully addressed in any and all development efforts. In general, aquaculture does not produce cheap food, albeit it has the capacity to do so in some circumstances. Given the growing supply gap for aqua-products and the much under-served intra-regional African market, it is likely that higher quality (more costly) products will dominate most of the market for some time to come.

Traditional public sector domains of research and education need also to be scrutinised. There is no doubt that considerable capacity building is needed and that education is an integral part of this strengthening. Yet, the staffing requirements from all areas are finite and raise the question of how much national agencies can invest to meet national targets. The question of weighing investment costs and outputs applies as well to research. Research is needed. It needs to be demand-driven and done in partnership with the private sector. But most research solutions have wide applicability and the economies of scale would prompt one to consider investing in regional or sub-regional research and education programmes as opposed to high-cost restrained national endeavours.

The preceding issues are inherent to any national aquaculture development programme and should form the bases for the elaboration of national aquaculture strategic frameworks which should guide the development of the sub-sector. A strategic framework is founded on the principles of comparative advantage – in other words, do things where they have the best chances of success and have them done by people who have the most vested interest combined with best technical ability.

In this approach, the starting point is the idea of “**clusters**” of activity. There are economic and production thresholds below which public or private support are not warranted. These thresholds, or production minima, correspond to a given level of effort – be it number of farmers, area in production or tons produced. Above this threshold, aquaculture becomes commercially feasible, while below, it is more of an adjunct and non-commercial undertaking.

The ability to establish a cluster depends upon the bio-physical and socio-economic parameters of any given site; sites that have the ability to “house” a cluster would be considered as **high potential zones** for the specific aquaculture production system in question. High potential zones for each

appropriate production system should be the areas of concentration of effort from both the public and private sectors.

The concepts of clusters and high potential zones are the core of the philosophy guiding the national strategic framework. Limited human and financial resources no longer allow governments to provide all services to all people. Efficiency and improved returns on investment require public agencies to invest where there is realistic potential. These same imperatives require government to retool and redefine its role, including the role of being the steward of an iterative and broad-based national strategy which guides the evolution of the sub-sector.

However, negative inertia and outmoded ways of doing business continue to confront developers. Change is often not easy, particularly when some perceive it as adversely affecting their lifestyles. Thus, while the public sector should have an intrinsic stake in elaborating and implementing national strategies, in the short-term, this may sometimes not be the case.

This lack of buy-in from the relevant public institutions should not be seen as a do-or-die conundrum. With a strategic approach founded on the principle of sustainable commercial aquaculture, the private sector should be aware that it has an equally innate advantage is achieving a functional and workable national strategy to guide the sub-sector's development.

In 1999, a United States fish farmer commented on the falling market prices: *"The failure stories about tilapia farming are terrible. People losing their life savings and going bankrupt. It's so sad. And it's sadder still that we who are in the industry don't do more to prevent it. Put out the word. Aquaculture is not for the faint of heart or for the financially weak. It's a tough business and tough to make a living at, forget about making money."*

Aquaculture can contribute to national policy objectives, stimulate investment and help fill the expanding aqua-products gap. Furthermore, the Third Millennium may well herald the Blue Revolution for Africa. But it will not be easy: aquaculture is tough business.

Aquaculture development in Africa is chronicled in *An indexed list of FAO publications related to aquaculture, 1964-2005* FAO Fisheries Circulars - C924, Rev.2 published in 2006. 111 pages. <ftp://ftp.fao.org/docrep/fao/009/a0524e/a0524e00.pdf> with additional publications listed at http://www.fao.org/fi/eims_search/publications_form.asp?lang=en

TABLE OF CONTENTS

PREPARATION OF THIS DOCUMENT	iii
ACKNOWLEDGEMENTS	iii
PREFACE	iv
EXECUTIVE SUMMARY	v
WHY “GUIDING PRINCIPLES”	1
INTRODUCTION	1
Aquaculture: What is it?	3
Definition of Terms	3
Chronic Constraints	4
LEARNING FROM THE PAST	5
What Went Wrong	5
<i>Project Design</i>	5
<i>Technology</i>	7
<i>Targeting</i>	15
<i>Conclusions</i>	17
What Went Right	18
<i>Critical Mass</i>	19
<i>Integration</i>	19
<i>Extension Model</i>	20
<i>Sharing Knowledge</i>	23
<i>Production Systems</i>	25
<i>Conclusions</i>	28
OPPORTUNITIES IN THE THIRD MILLENNIUM	32
The Need For National Strategies	33
Priority Setting	35
Strategic Approaches	37
<i>Seed</i>	37
<i>Feed</i>	38
<i>Credit</i>	39
<i>Marketing</i>	39
<i>Information</i>	40
<i>Education</i>	40
<i>Research</i>	41
<i>Cross-cutting elements</i>	41
How To Implement A Strategy?	42
Best Practices	43
Regional Issues	43
Risks	44

CONCLUSIONS & RECOMMENDATIONS	46
WHAT NEEDS TO BE DONE?	46
Governments	47
Industrial Producers & International Investors	48
Small- & Medium-Scale Commercial Producers	48
The Non-Commercial Segment	49
Service Providers	49
Civil Society	50
International Community	50
<i>Appendix I: 1999 Africa Regional Aquaculture Review -- Executive Summary:</i>	52
<i>Appendix II: Limbé Declaration:</i>	55
<i>Appendix III: Elements of the Cameroon Strategic Framework and the Role of Public and Private Sectors</i>	57
<i>Appendix IV: The NEPAD Action Plan for the Development of African Fisheries and Aquaculture</i>	63
<i>Appendix V: Case in Point – Aquaculture Development in the Lake Basin Area of Kenya</i>	70
<i>Appendix VI: Review of Aquaculture Extension in the Africa Region</i>	81
<i>Appendix VII: Field Notes for African Freshwater Aquaculture</i>	89

*Give someone a fish and they will have a meal.
Teach someone how to make money raising fish and many people will have many meals.
[modification of oft-cited "aquaculture proverb"]*



WHY "GUIDING PRINCIPLES"

Aquaculturally, the Africa Region is quite homogenous. This homogeneity is not in terms of social structure, climate or economic environment; it is with regard to the general level of development. Most of Africa has an under-developed aquaculture sector. The paltry contribution of Africa to the global aquaculture harvest is well documented and will not be further addressed in this document. However, the newness of aquaculture in Africa means that most countries are on similar footings; sharing analogous constraints and comparable opportunities.

This similarity is further exemplified by the relatively narrow range of culture systems and organisms. Clariid catfishes and tilapias account for the majority of finfish culture; generally raised in ponds, but with growing use of tanks and cages. Throughout most of the region, these culture systems benefit from the comparative advantages of reasonably cheap land and labour; frequently combined with available and affordable water.

These commonalities denote a situation where, to a large extent, common solutions can be applied to common problems. This is not to be confused with a "cookbook approach" where pre-determined and prescriptive technology packages are proposed. The similarity suggests rather that **mutual methodologies** can be applied to parallel subjects; these adjusted and adapted to specific circumstances.

The approaches to these mutual methodologies are embodied in guiding principles: broad-spectrum canons that can orient national development programmes. These principles serve as reference points which can facilitate the evolution of the developmental processes and circumvent costly preparatory activities, without repeating errors of the past. They serve as a generic road map which is built on three decades of experience and reflects wide-spread consensus as to best practices.

INTRODUCTION

Aquaculture, in a classical sense, is an introduction to Africa. Traditional aquacultural systems, including whedos, acadjas, howash and others, have been used for centuries and are integral parts of customary food production or procurement practices. These techniques, however, are extensive and highly dependant upon unencumbered access to environment goods and services; access which is under increasing pressure from growing populations and competition for resources. Hence, although important at community and family levels in many instances, these time-honoured ways

are in decline and have little potential to make significant contributions to national fish supply.

It is introduced production practices that have the potential, albeit still largely untapped, to add appreciably to national fish supply. These are principally pond culture systems introduced over five decades ago as sources of high protein food. Early, mostly colonial, advocates saw lush tropical climates as the ideal environments for raising tons of fast-growing African fishes, providing cheap food for labourers and the underprivileged.

This initial justification persisted for several decades as aquaculture, chiefly fish farming, was seen as an “easy” way to make use of available resources through the construction of family fishponds for food and income. Success stories included families using money from fish sales to pay school fees or purchase roofing materials as well as having highly-prized food for celebrations. These fishponds were stocked with locally available species which were fed household scraps and by-products from other family farm enterprises. Family fish farming became the centrepiece of most national aquaculture development programmes in Africa in the 1970s, and continues today as one of the frequently encountered reasons for supporting aquaculture.

In the 1980s, the family fishpond component of national programmes was, in some cases, complemented by larger-scale production using a variety of systems including, among others, commercial-scale pond-based farms in Nigeria and Malawi, raceways in Congo and Burkina Faso, cages in Niger and Côte d'Ivoire along with tanks in Zimbabwe and Kenya. However, within a decade many of these larger enterprises had failed and family production remained the mainstay of most programmes; these heavily subsidised by donors.

When family fishpond aquaculture failed to meet expectations for improved food security and economic growth, international aid donors became widely disenchanted; regardless of whether these expectations were realistic or not. Farm-raised fish continued to make minimal contributions to national fish supply, farmers continued to rely on external support and national institutions continued to have difficulty supporting the sector. By the mid-1990s, bi- and multi-lateral support to aquaculture in Africa hit all-time lows as the balloon of the aquaculture miracle burst and national programmes slumped without their accustomed extra-budgetary support from donors.

This slump effectively crippled national programmes in many countries. National infrastructure and services shrivelled, generally atrophying to unusable levels. Farmers, who had become attuned to a high degree of public assistance, either abandoned their ponds or allowed them to revert to a near-natural state. Government agents, no longer receiving emoluments from donor-driven interventions, stopped going into the field. Government agencies were further weakened by the combined and growing effects of HIV/AIDS, a brain drain to the African Diaspora and early retrenchments resulting from declining national budgets.

Paradoxically, as public services reached their nadir, a second wave of private sector aquaculture investment arose in some countries. By the close of the 20th century, private-sector-driven enterprises had established firm foundations in, to name a few, Zambia, Zimbabwe, Nigeria, Madagascar, South Africa and Côte d'Ivoire. These new firms included not only the oft-seen tilapia and catfish systems but also mariculture with the lead being taken by Madagascar for shrimp and South Africa for molluscs.

With the arrival of the new millennium, aquaculture in Africa seems perched on the verge of a favourable future. There are new and realistic understandings of what aquaculture can, and cannot do. There is a new, and often dynamic political will. There is high demand for aquatic products and an invigorated investment environment. But, there is also a loss of institutional memory and an abundance of misinformation concerning the pragmatic contribution of aquaculture to national economies and market baskets. For this bright future to become a reality, one must heed lessons learnt and approach aquaculture development strategically and sensibly.

Aquaculture: What is it?

A number of descriptions of aquaculture exist and have often been the subject of academic discussion as to their thoroughness in encompassing the sector. For the purposes of the present document, aquaculture will be considered as any of the various **aquatic production systems** which are under the control of the producer for any part of the production cycle and which produce a crop which is “owned” by the producer (ownership, corporate or individual, applying to both formal and traditional rights to the produce).

Definition of Terms

Any discussion of aquaculture development must use specific terminology for which there is mutual understanding as to its use and content. A key issue is the classification of different levels of aquacultural production. Various authors have chosen barometers of intensity: extensive, semi-intensive or intensive. Some have preferred delineation based on size: small-, medium- or large-scale. Other adjectives that have frequently been used to categorise various modes of production include urban, peri-urban, rural, smallholder, subsistence, middle-income, emergent or peasant.

In concert with prevailing terminology, the following discussions will classify production as being **commercial** or **non-commercial**. The distinction between these two management styles is not always clear-cut, but the overriding indication is that the former is managed as a for-profit business with the producer investing capital in the enterprise, and cash returns on investment the main criterion of success. Commercial aquaculturists are active players in the market economy. They purchase inputs, including labour. Commercial operations can be of any scale (small, medium or large), even micro-enterprises. Commercial firms can be urban, peri-urban or rural; their sites determined by the most profitable location as decided by the operator.

A subset of the commercial category is **industrial** production. This level of management fulfils all the prerequisites of commercial operations, but is undertaken on a larger scale. Industrial operations are much less dependent upon public sector support, relying predominately upon an enabling environment to muster substantial private investment. These firms have adequate capital resources to ensure the supply of all needed inputs including information (technical assistance). Accordingly, industrial operators would most often not be the direct beneficiaries of public sector promotion and support efforts.

Non-commercial farmers are not farmers who do not want to make money from their fishpond or other production system. It goes without saying that all farmers would make money if they could, and most non-commercial producers do sell part of their crop. However, these farmers do not manage or invest in their aquatic resources as a business. Their aquatic production is a part of a complex mosaic of farming systems which are complementary and risk-reducing. Their aquatic produce is important for home consumption as well as being a “bank” where a sellable product is available when needed; a product that comes in small packages and allows the farmer to have quick access to small amounts of cash as opposed to selling another more expensive item (e.g., goat or chicken). As with the alternative, non-commercial production can be of any scale as well as being urban or rural.

This dichotomy may appear convoluted and full of contradictions. Admittedly, it is somewhat subjective, but it represents the present conventional wisdom as to how to conceptualise different levels of production; in the over-view, based on the producers’ motives more than the technology applied. It has been suggested that the commercial group represents fish farmers while the non-commercial group consists of farmers with fishponds.

Another area of controversy in regard to choice of terms is with respect to **policies, strategies and plans**. For the purposes of subsequent discussions, policies are considered as high-level (macro) objectives and goals. It is understood that most, if not all governments have policy objectives (e.g., eradication of poverty, accelerated economic growth, improved equity, etc.). A strategy is the pathway by which policy objectives are achieved; a set of tactics along with designated roles and responsibilities which define processes to be employed in reaching the designated goals. Strategies are plastic, flexible and iterative, changing to meet new conditions. Plans are specific descriptions of activities to be undertaken within the context of the strategic pathway. Plans are implemented over a fixed time and area and, once completed, are replaced by a new plan.

Chronic Constraints

For at least the past three decades there have been periodic reviews of the status of aquaculture in Africa; each trying to identify the key reasons for its lack-lustre performance. While different reviewers have had different perspectives as to the root causes of the poor results, in spite of significant overall investment, there have been five common cross-cutting factors. These

omnipresent constraints are: (i) lack of good quality seed; (ii) lack of good quality feed; (iii) lack of capital; (iv) lack of access to appropriate information; and, (v) lack of markets. In the aggregate, these “big five” affect aquaculture development as much today as they did in the 1970s.

LEARNING FROM THE PAST

Aquaculture in Africa has almost been a mystic endeavour. With near pious fervour, enthusiasts have lobbied for support to the sub-sector; often in the complete absence of any tangible benefits. Accordingly, as with many enigmatic ventures, when disappointment struck, there was a negative backlash – aquaculture transformed from a panacea to a pariah.

Today we have the extravagance of analysing past efforts without suffering the trials and tribulations experienced by those who were first attempting to make the sector work. Unfortunately, much of this analysis is done in the abstract without the benefit of the first-hand accounts of preceding actors. In fact, as previously mentioned, there has been an acute loss of institutional memory over the last 20 years which makes learning from the past that much more difficult and important.

If the present is a reflection of the past, the present situation for most national aquaculture programmes in Africa could be typified by several thousand, widely dispersed family (non-commercial) fishponds producing 500-1 000 kg/ha/yr, at best. To this can be added varying, but increasing, amounts of contemporary commercial production from a combination of small-, medium- and large-scale producers.

Consequently, many national aquaculture programmes are comprised of two parallel components corresponding to commercial and non-commercial production systems. Future efforts to establish productive and sustainable national programmes must take into account this dual architecture from the perspective of what historically did or did not work.

The following two sections will highlight experience gained from field-level aquaculture development efforts over the past thirty-five years: those actions that did not foster sustainable results, although they expanded the knowledge base; and those actions that produced enduring results and which now form the foundation of many of today’s development strategies. These generalities will be complimented by specific examples of aquaculture projects and producers, presented in boxes. Following these discussions, the experiences will be synthesised into a succinct list of lessons learnt.

What Went Wrong

Project Design

At the onset, there was practically universal acceptance that aquaculture was a good idea. Having a pond in and of itself was often considered as a worthy accomplishment, irrespective of its true costs and benefits. This phenomenon was witnessed by the fact that many early projects targeted