



Secure Fisheries
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Guidelines for the Development of an Environmental Social Impact Assessment/ Environmental and Social Management Plan for the Tilapia Aquaculture Industry



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Guidelines for the Development of an
Environmental Social Impact Assessment/
Environmental and Social Management Plan
for the Tilapia Aquaculture Industry

GCP/RAF/466/EC SmartFish Project

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Acronyms and abbreviations

ADB	African Development Bank
BOD	Biochemical Oxygen Demand
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
TSC	Timed Species Counts

1. Introduction

The overall objective of this document is to help operators wishing to invest in the development of Tilapia aquaculture with the statutory obligation of producing an environmental and social impact assessment (ESIA) and drafting of an environmental and social management plan (ESMP).

The specific objectives of this document are to:

- ♥ Help potential operators compile a constructive document that will pave the way for a consensual relationship with both the administration and the local population;
- ♥ Reduce the time needed to produce an ESIA and an ESMP through the provision of clear guidelines and general information to ensure all stakeholders know what is expected;
- ♥ Support private sector risk and efforts by providing a clear outline of the benefits of this approach and showing how the various procedures can be financially profitable in the long-term if carried out properly and with the appropriate follow-up.

These guidelines concern mainly Tilapia cage aquaculture as this resource has the capacity to provide hundreds of thousands of tonnes of fish for Africa in one generation.

These guidelines are based on:

- ♥ ESIA policies and guidelines of the African Development Bank (ADB);
- ♥ EIA templates from the internet or from actual EIAs undertaken by industrial farms in sub-Saharan Africa (Kenya, Uganda, Zambia, Ghana);
- ♥ Some of the main financial reasons and benefits of undertaking an ESIA and developing a comprehensive ESMP.

2. Notes for potential investors/operators

An environmental and social impact assessment is a legal obligation and most countries have a list of consultants who are legally allowed to perform them. These lists are usually made up of competent, scientific experts who can be quite expensive due to the *de facto* monopoly of the situation. Potential investors/operators should therefore be aware of the following:

Price

The entry price for an ESIA and an ESMP related to an industrial aquaculture cage farm can be as high as US \$100,000.

- ♥ Investors/operators should negotiate with different consultants;
- ♥ Payments should be linked on clear milestones;
- ♥ To safeguard against unsatisfactory deliverables, clear rules for contract termination should be negotiated, accepted and included in the contract.

Schedule

Any contract should be strict about delays and if necessary, financial penalties should be included in the contract.

Quality and long-term usefulness

The present document is to advise investors/operators on how best to undertake ESIA & EMPS procedures and at the same time maximise value for money. Close collaboration with the consultant throughout the ESIA & EMPS process should ensure the following:

- ♥ Mitigation of any socio economic problems with the local population;
- ♥ Avoidance of technical mistakes;
- ♥ Avoidance of any wrongful implementation;
- ♥ Protection of future expansion potential.

Appropriate, planned follow-up should also lead to:

- ♥ Better mitigation measures against any risks of disease;
- ♥ Mitigation measures against inappropriate and costly feeding practises through pollution monitoring;
- ♥ A reduction in predators, in particular birds and humans, through monitoring.

Conclusion

For both the short and long term, make the best use of ESIA & ESMP constructive potentialities by developing an overarching collaboration with the consultant/team. If the consultant/team is underperforming, do not hesitate to terminate the contract, in the long run it will be cheaper.

3. An overview of the scope of work necessary for an environmental and social impact assessment

Based on the ESIA policies and guidelines of the African Development Bank

This section defines the objectives of an ESIA and summarises the scope of work to be carried out during an ESIA study.

The scope and level of work involved in the preparation of the ESIA should be proportional to the project's potential impacts. It will also depend on the type of aquaculture, size of production and the requirements of the countries concerned.

The most important tasks for an ESIA include:

- ♥ A detailed description of the proposed project including an overview of the project's most relevant components;
- ♥ Identification of the policies, legal and administrative frameworks relevant to the project;
- ♥ The definition and justification of the project study area for the ESIA;
- ♥ A description and analysis of the natural and human environmental conditions in the study area before project implementation. This analysis must include any relationships between environmental and social components and any importance that society and local populations attach to such components. This will help identify high value environmental and social components or those representing a particular interest;
- ♥ A description and assessment of any existing environmental policies and legal requirements with a view to recommending remedial measures for any issues that concern the proposed cage farming operations;
- ♥ An assessment of all possible environmental and social impacts of the proposed cage farming development and potential expansion;
- ♥ An assessment of all possible environmental and social impacts of the proposed feed production operations;
- ♥ An assessment of all possible environmental and social impacts of the proposed fish processing operations;
- ♥ A proposition of mitigation measures that would minimize any negative environmental impacts;
- ♥ A description and assessment of any environmental impacts that are likely to be the result of any increased production of fry and/or fingerlings in ponds, especially if more tanks will be required;
- ♥ A description and assessment of any environmental impacts that are likely to result from planned successive installation phases, the operation of additional cages and any expected increases of production levels;

- ♥ An overall review of the cage farming project proposal in relation to the fish farming industry;
- ♥ Identification and review of any legislation of the concerned country and/or if applicable, international legislation of water bodies for riparian countries (e.g. Water Acts, Environmental Acts, Labour Acts, Agricultural Acts, Movement of Animals Acts, Veterinary Acts, Use of Chemicals Acts, etc.);
- ♥ Identification of any specific approvals that might be required in terms of such legislation (e.g. use of water bodies, investment licences, water quality issues, nutrient levels in water, etc.);
- ♥ A review of the physical, geographical and climatic information of any potential cage sites. Comment on the appropriateness and scale of the sites for the proposed business: include mitigation measures if necessary;
- ♥ A review of the impacts of the project on wildlife in the area (including other fish, birds, aquatic fauna and flora, etc.). Propose ways to enhance positive aspects and measures to mitigate against any negative impacts;
- ♥ Identification of any natural predators that might adversely affect aquaculture at the site and propose acceptable ways of mitigating against predation losses;
- ♥ An examination of potential species for their suitability at the desired location;
- ♥ Identification of any special precautions that should be taken by investors/operators with respect to these species or with regard to the desired sites;
- ♥ Identification of any known disease risks for fish at project sites and recommend suitable mitigation measures;
- ♥ An analysis of the physicochemical and biological composition (water column depth, water transparency, water temperature, dissolved oxygen concentration, pH, conductivity, nutrient status, algal and invertebrate communities (zooplankton and macro-benthos) of the water and the fish community at proposed cage sites as well as any streams in the vicinity of the sites and mention any seasonal changes. Review and comment on any historical changes in the chemical and biological composition of the lake water at proposed cage sites over the years;
- ♥ A review and comment on the suitability of the water for cage fish farming;
- ♥ An assessment of water flow at the proposed site and relevant comments;
- ♥ An assessment of all potential pollution risks to the project, especially those from land use in the catchment area (effluents from fish processing, tanneries, industry, etc.);
- ♥ Identification of any new or proposed developments in the area (e.g. factories, agriculture, etc.) that may affect water and/or air quality in any way, or have any kind of impact on the quality of the proposed site;

- ♥ An assessment of feed availability, the feeding regime and water flow at proposed sites and water quality consequences of the feeding regimes;
- ♥ An assessment of sedimentation in terms of uneaten feed or droppings from the cages that may cause changes in physicochemical parameters, particularly the biochemical oxygen demand (BOD) and dissolved oxygen concentration levels;
- ♥ Assess the potential changes in both the abundance and species richness of phytoplankton, zooplankton, benthic invertebrates and fish due to any changes in environmental conditions;
- ♥ An assessment of the potential effects of cage culture on the behaviour and ecology of wild populations of fish in the surrounding area;
- ♥ A survey on avifauna in the vicinity of the site using timed species counts (TSCs). Opportunistic observations should also be included in the species lists. Abundance should be estimated from TSC codes that give a measure of the absolute abundance. Bird species recorded should be classified in ecological categories where possible, based on the standard habitat classification by Bennun et al (1996). Birds should be further classified according to their conservation status;
- ♥ An assessment and description of any bird habitats, including the dominant vegetation type observed and land use/land cover;
- ♥ Liaison with key stakeholders as part of the ESIA consultation process to assess their views of the project and to address any issues raised by local fishermen/communities who are likely to be affected by fish farm activities;
- ♥ Participation in ESIA field activities to identify and evaluate any potential impacts of the project and recommend feasible and cost-effective measures for the mitigation of any negative impacts. Findings should be used for the production of an Environmental Impact Report that will guide the operator in day-to-day operations;
- ♥ A review of any cage site concession/tenure issues with regard to the use of the lake for cage fish farming and comment accordingly;
- ♥ An assessment of any impacts of the project in terms of employment and overall wealth creation in the area;
- ♥ A review of any impacts the project might have on existing users (fisher folks, navigation, etc.) and on tourism. Potential water use conflicts associated with existing use of the lake by local communities should be examined and mitigation measures for potential conflicts drawn up;
- ♥ Identification of any impacts the project will have on local communities. Recommend ways to enhance positive impacts and mitigate against any negative impacts;

- ♥ Identification of ways in which the project could benefit local communities, in particular the most vulnerable (e.g. people living with HIV, female headed households, disabled, etc.) and suggest ways that the project could positively influence the eradication of common but preventable diseases such as malaria, diarrhoea and childhood malnutrition;
- ♥ A review of the risk of stock theft at the site: appropriate and cost effective means of securing the site should be put forward;
- ♥ A presentation and analysis of alternatives to the proposed project, including a 'without project' option, by identifying and comparing alternatives based on technical, economic, environmental and social criteria. For selected alternatives, any beneficial and adverse environmental and social, direct and indirect, short- and long-term, temporary and permanent impacts should be identified and assessed;
- ♥ The definition of appropriate mitigation/enhancement measures to prevent, minimise, mitigate, or compensate for adverse impacts or to enhance the project's environmental and social benefits, including responsibilities and associated costs;
- ♥ A review of potential cumulative effects taking into account other initiatives planned in the study area;
- ♥ The development of an environmental and social monitoring programme, including indicators, institutional responsibilities and associated costs;
- ♥ Consultations with primary and secondary stakeholders to obtain opinions and preoccupations about the project. These consultations should take place both during the preparation of the ESIA report to identify key environmental and social issues and impacts, and upon completion of the draft ESIA report, to obtain comments on proposed mitigation/enhancement measures;

The ESIA should be prepared according to the generic contents presented in Chapter 4 below.

The Environmental and Social Management Plan (ESMP) should be prepared according to the generic contents given in Annex 11 of the ADB guidelines. The management plan should be drafted and presented as a separate document from the ESIA report.

4. Skeleton template for the compilation of an ESIA report

EXECUTIVE SUMMARY

1.0 INTRODUCTION

- 1.1 Background
- 1.2 Purpose of the Project

2.0 LEGAL AND REGULATORY FRAMEWORK

3.0 PROJECT DESCRIPTION

- 3.1 The Production System
 - 3.1.2 Feeding
 - 3.1.3 Fish Harvesting
 - 3.1.4 Fish Processing
- 3.2 Infrastructure and Facilities
 - 3.2.1 Land
 - 3.2.2 Ponds
 - 3.3.1 Water Supply and Drainage System
 - 3.3.3 Ancillary Facilities
 - 3.3.4 Onshore Cage Aquaculture
 - 3.3.5 Alternative Cage Location
- 3.4 Labour Requirements
- 3.5 Potable Water and Electricity Supply

4.0 CONSIDERATION OF ALTERNATIVE SITES AND TECHNOLOGY

5.0 BASELINE INFORMATION

- 5.1 Location
- 5.2 Climate
- 5.3 Topography, Soil and Physiography
- 5.4 Flora and Fauna
 - 5.4.1 Flora
 - 5.4.3 Fauna
- 5.5 Socioeconomic Characteristics
 - 5.5.1 Settlements
 - 5.5.2 Economic Activities and Land Use

- 5.5.3 Social Amenities
- 5.5.4 Drainage
- 5.5.5 Health Status
- 5.6 Ambient Air Quality
- 5.7 Noise
- 5.8 Water Quality
- 6. IDENTIFICATION AND ASSESSMENT OF IMPACTS
 - 6.1 Construction Phase Impacts
 - 6.1.1 Destruction of Flora and Displacement of Fauna
 - 6.1.2 Changes in Ambient Air Quality
 - 6.1.3 Changes in Ambient Noise Levels
 - 6.1.4 Changes in Site Topography
 - 6.1.5 Occupational Accidents
 - 6.1.6 Public Safety
 - 6.1.7 Socioeconomic Impacts
 - 6.2 Identification and Assessment of Operational Phase Impacts
 - 6.2.1 Impact on Site Hydrology
 - 6.2.2 Changes in the Status of Aquatic Flora and Fauna
 - 6.2.3 Impact on Water Quality
 - 6.2.4. Ambient Noise Levels
 - 6.2.5 Impact of Waste Generation
 - 6.2.6 Impact of Fry Sex Reversal Process
 - 6.2.7 Fish Diseases
 - 6.2.8 Impact on Tilapia Genome
 - 6.2.9 Occupational, Public Health and Safety
 - 6.2.10 Socio-economic Impacts
- 7. MITIGATION OF SIGNIFICANT NEGATIVE IMPACTS
 - 7.1 Mitigation Construction Phase Impacts
 - 7.1.1 Air Quality
 - 7.1.2 Human-Vehicular Conflicts
 - 7.1.4 Noise

- 7.2 Mitigation of Operational Phase Impacts
 - 7.2.1 Occupational, Public Health and Safety
 - 7.2.2 Mitigation of Poor Water Quality
 - 7.2.3 Changes in the Status of Aquatic Flora and Fauna
 - 7.2.5 Fish Diseases
 - 7.2.6 Waste Generation
 - 8. PROVISIONAL ENVIRONMENTAL MANAGEMENT PLAN
 - 8.1 Monitoring And Protection Controls
 - 8.1.1 Water Quality
 - 8.1.2 Health and Safety
 - 8.1.3 Fish disease
 - 8.1.4 Staff Training
 - 8.2 Institutional Structure
 - 9. DECOMMOSSIONING PLAN
 - 10. CONCLUSION
- APPENDICES
- ♥ List of professionals and organisations having contributed to the preparation of the ESIA report.
 - ♥ List of documents consulted, including project-related reports.
 - ♥ Baseline data referred to in the report.
 - ♥ Records of any consultation meetings with primary and secondary stakeholders. Environmental and social screening

5. Sample TOR for an ESIA and an ESMP for an industrial caged fish farm

Based on the objectives and scope of the ESIA guidelines of the African Development Bank

1. Introduction

Description of the company.

2. Context

Description of the institutional, geographical, environmental, social and economic context in which the company and its development plans are taking place.

Relevant information on the objectives and various components of the project, as well as on the study area should be given so that any person interested in the project is able to understand the situation and potential constraints. This section should also include any source/s of information that could be useful for the completion of the environmental and social impact assessment (ESIA).

3. Requirements

The assessment should review the environmental and social impacts that the company might exert on XXX (place) and its environs, and to a lesser extent on the country.

The main objective is to identify, quantify and comment on the various environmental and social impacts that are likely to occur during the development of a fully integrated caged fish farm producing and processing up to 10,000 Tilapia.

The policies and guidelines of the African Development Bank (ADB) shall be followed to carry out the ESIA. These may be found on the ADB website: www.afdb.org

The Terms of Reference have been prepared for approval by the National Environment Management Authority as per Article XXX of The Environmental Impact Assessment Regulations, dated XXX.

4. Objectives and Scope of Work

This section defines the objectives of the ESIA and summarises the scope of work to be carried out by indicating the key tasks to be undertaken as part of the study.

The scope and level of work involved in the preparation of the ESIA should be proportional to the project's potential impacts.

The main tasks for the consultant should be highlighted in this section due to their importance in the ESIA report and should include amongst others:

- ♥ A detailed description of the proposed project and its relevant components;

- ♥ Identification of the policies, legal and administrative frameworks relevant to the project;
- ♥ The definition and justification of the project study area for the ESIA;
- ♥ A description and analysis of the natural and human environment conditions in the study area before project implementation. This analysis must include any relationships between environmental and social components and any importance that society and local populations attach to these components. This will help identify high value environmental and social components or those representing a particular interest;
- ♥ A description and assessment of any existing environmental policies and legal requirements with a view to recommending remedial measures for any issues that concern the proposed cage farming operations;
- ♥ An assessment of all possible environmental and social impacts of the proposed cage farming development and potential expansion;
- ♥ An assessment of all possible environmental and social impacts of the proposed feed production operations;
- ♥ An assessment of all possible environmental and social impacts of the proposed fish processing operations;
- ♥ A proposition of mitigation measures that would minimize any negative environmental impacts;
- ♥ A description and assessment of any environmental impacts that are likely to be the result of any increased production of fry and/or fingerlings in ponds at XXX, especially if more tanks will be required;
- ♥ A description and assessment of any environmental impacts that are likely to result from the installation and operation of additional cages: from a production level of XX tonnes per annum to XXX tonnes per annum;
- ♥ An overall review of the cage farming project proposal in relation to the fish farming industry;
- ♥ Identification and review of any legislation of XXX (country) or international law that may affect the development of the company Water Acts, Environmental Acts, Labour Acts, Agricultural Acts, Movement of Animals Acts, Veterinary Acts, Use of Chemicals Acts, etc.);
- ♥ Identification of any specific approvals that might be required in terms of such legislation (e.g. use of water bodies, investment licences, water quality issues, nutrient levels in water, etc.);
- ♥ A review of the physical, geographical and climatic information of any potential cage sites. Comment on the appropriateness and scale of the sites for the proposed business: include mitigation measures if necessary;

- ♥ A review of the impacts of the project on wildlife in the area (including other fish, birds, aquatic fauna and flora, etc.). Propose ways to enhance positive aspects and measures to mitigate against any negative impacts;
- ♥ Identification of any natural predators that might adversely affect aquaculture at the site and propose acceptable ways of mitigating against predation losses;
- ♥ An examination of potential species for their suitability at the desired location;
- ♥ Identification of any special precautions that should be taken by investors/operators with respect to these species or with regard to the desired sites;
- ♥ Identification of any known disease risks for fish at project sites and recommend suitable mitigation measures;
- ♥ An analysis of the physicochemical and biological composition (water column depth, water transparency, water temperature, dissolved oxygen concentration, pH, conductivity, nutrient status, algal and invertebrate communities (zooplankton and macro-benthos) of the water and the fish community at proposed cage sites as well as any streams in the vicinity of the sites and mention any seasonal changes. Review and comment on any historical changes in the chemical and biological composition of the lake water at proposed cage sites over the years;
- ♥ A review and comment on the suitability of the water for cage fish farming;
- ♥ An assessment of water flow at the proposed site and relevant comments;
- ♥ An assessment of all potential pollution risks to the project, especially those from land use in the catchment area (effluents from fish processing, tanneries, industry, etc.);
- ♥ Identification of any new or proposed developments in the area (e.g. factories, agriculture, etc.) that may affect water and/or air quality in any way, or have any kind of impact on the quality of the proposed site;
- ♥ An assessment of feed availability, the feeding regime and water flow at proposed sites and water quality consequences of the feeding regimes;
- ♥ An assessment of sedimentation in terms of uneaten feed or droppings from the cages that may cause changes in physicochemical parameters, particularly the biochemical oxygen demand (BOD) and dissolved oxygen concentration levels;
- ♥ Assess the potential changes in both the abundance and species richness of phytoplankton, zooplankton, benthic invertebrates and fish due to any changes in environmental conditions;
- ♥ An assessment of the potential effects of cage culture on the behaviour and ecology of wild populations of fish in the surrounding area;

- ♥ A survey on avifauna in the vicinity of the site using timed species counts (TSCs). Opportunistic observations should also be included in the species lists. Abundance should be estimated from TSC codes that give a measure of the absolute abundance. Bird species recorded should be classified in ecological categories where possible, based on the standard habitat classification by Bennun et al (1996). Birds should be further classified according to their conservation status;
- ♥ An assessment and description of any bird habitats, including the dominant vegetation type observed and land use/land cover;
- ♥ Liaison with key stakeholders as part of the ESIA consultation process to assess their views of the project and to address any issues raised by local fishermen/communities who are likely to be affected by fish farm activities;
- ♥ Participation in ESIA field activities to identify and evaluate any potential impacts of the project and recommend feasible and cost-effective measures for the mitigation of any negative impacts. Findings should be used for the production of an Environmental Impact Report that will guide the operator in day-to-day operations;
- ♥ A review of any cage site concession/tenure issues with regard to the use of the lake for cage fish farming and comment accordingly;
- ♥ An assessment of any impacts of the project in terms of employment and overall wealth creation in the area;
- ♥ A review of any impacts the project might have on existing users (fisher folks, navigation, etc.) and on tourism. Potential water use conflicts associated with existing use of the lake by local communities should be examined and mitigation measures for potential conflicts drawn up;
- ♥ Identification of any impacts the project will have on local communities. Recommend ways to enhance positive impacts and mitigate against any negative impacts
- ♥ Identification of ways in which the project could benefit local communities, in particular the most vulnerable (e.g. people living with HIV, female headed households, disabled, etc.) and suggest ways that the project could positively influence the eradication of common but preventable diseases such as malaria, diarrhoea and childhood malnutrition;
- ♥ A review of the risk of stock theft at the site: appropriate and cost effective means of securing the site should be put forward;
- ♥ A presentation and analysis of alternatives to the proposed project, including a 'without project' option, by identifying and comparing alternatives based on technical, economic, environmental and social criteria. For selected alternatives, any beneficial and adverse environmental and social, direct and indirect, short- and long-term, temporary and permanent impacts should be identified and assessed;

- ♥ The definition of appropriate mitigation/enhancement measures to prevent, minimise, mitigate, or compensate for adverse impacts or to enhance the project's environmental and social benefits, including responsibilities and associated costs;
- ♥ A review of potential cumulative effects taking into account other initiatives planned in the study area;
- ♥ The development of an environmental and social monitoring programme, including indicators, institutional responsibilities and associated costs;

Consultations with primary and secondary stakeholders should be undertaken to obtain opinions and preoccupations about the project. These consultations should take place both during the preparation of the ESIA report to identify key environmental and social issues and impacts, and upon completion of the draft ESIA report, to obtain comments on proposed mitigation/enhancement measures;

Preparation of an Environmental and Social Management Plan (ESMP) according to the generic contents given in Annex 11 of the ADB guidelines. This management plan should be presented as a separate document from the ESIA Report.

5. Schedule

The consultant shall present the ESIA preliminary draft no later than XXX (date), for review by XXX (name). The final report shall be delivered in hard copy and by e-mail to XXX (name) by XXX (date).

6. Study Team and Reporting

The ESIA report should be presented in a clear and concise manner and focus on all relevant and significant environmental and social issues that contribute to a thorough understanding of the project and its impacts. The scope and level of detail of the report should be proportional to the project's potential impacts.

The ESIA report should describe the scientific approach adopted to carry out the studies, notably all models, methods and criteria used. The report should also include maps and drawings to scale where appropriate and make reference to all documents consulted.

The ESIA report must be prepared in English. The ESIA Executive Summary should be concise and written in laymen's terms.

The ESIA study team should be lead by a Team Leader, XXX (name) who is a registered ESIA consultant (Certificate No. XXX) and an Environmental Audit Consultant. The team could be made up of: a Fish Ecologist, an Ornithologist, a Socio-economist and a Water Resources Expert.

The ESIA report will be written following the completion of data collection and analyses and submitted to the client who will then submit it to the relevant authorities.

SmartFish is a regional fisheries project managed by the Indian Ocean Commission, funded by the European Union and co-implemented by the Food and Agriculture Organization of the United Nations. SmartFish, which operates in 20 countries throughout the East and Southern Africa - Indian Ocean region, focuses on fisheries governance, management, monitoring, control and surveillance, trade, and food security.

Over the years Tilapia has taken on an important role in the commercial fish farming business sector. As Tilapia is a much appreciated and a fast growing fish species, demand is high both locally and internationally. If undertaken in the correct manner, caged fish farming enterprises can provide stable employment and substantial financial rewards for the local population.

The main objective of this document is to help investors/operators wishing to invest in the development of Tilapia aquaculture with the statutory obligation of producing an environmental and social impact assessment (ESIA) and drafting of an environmental and social management plan (ESMP).

These guidelines concern Tilapia cage aquaculture as this resource has the capacity to provide hundreds of thousands of tonnes of fish for Africa in one generation.



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