National Strategic Plan for Aquaculture Development 2014-2020

DRAFT

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List of abbreviations

CEFTA – Central European Free Trade Agreement
CFP – Common Fisheries Policy
CLLD – Community Led Local Development
CMO –Common Market Organization
CPA – Coastal Protection Area
CPR –Common Provisions Regulation
MS – member state
EAFRD –European Agriculture Fund for Rural Development
CF – Cohesion Fund
EMFF – European Maritime and Fisheries Fund
EFRD - European Fund for Regional Development
EIA Directive –Environmental Impact Assessment Directive
EC – European Commission
EP – European Parliament
ESI funds –European Structural and Investment Funds
EU – European Union
EU-27 – the European Union member states, the Republic of Croatia not included
EUR/€ - Euro
CCE – Croatian Chamber of Economy
CCTC – Croatian Chamber of Trades and Crafts
ICZM – Integrated Coastal Zone Management
IMP –Integrated Maritime Policy
ITA – Italy
MA – Ministry of Agriculture
MSFD –Marine Strategy Framework Directive
OG – Official Gazette
NSCE – National Standard Classification of Education
NSPA – National Strategic Plan for Aquaculture Development
OP – Operational Programme
R&D –Research and Development
RAS – Recirculating Aquaculture System
RC – the Republic of Croatia
SEA Directive – Strategic Environmental Assessment Directive
SF – Structural Funds
SWOT –Strength, Weakness, Opportunity, Threat
TO – Thematic Objectives
UK – the United Kingdom
USD/$ – the United States dollar
WFD –Water Framework Directive

1. Summary

In accordance with Article 34 of the European Parliament and Council Regulation (EU) No. 1380/2013 of 11 December 2013, concerning the common fishery policy[1], the Republic of Croatia has to adopt the multi-annual National Strategic Plan for Aquaculture 2014-2020 (hereinafter: NSPA), which is being prepared and coordinated by the Ministry of Agriculture. The preparation of the NSPA is important both from the viewpoint of planning and positioning of farming activities, as well as from the viewpoint of fulfilling the necessary conditions for the use of European Maritime and Fisheries Fund (hereinafter: EMFF). As a strategic document, the NSPA defines the objectives and priorities for aquaculture development in the 2014-2020 period. By the end of 2020, the total production in aquaculture is expected to reach 24,050 tonnes, while adhering to the principles of economic, social and environmental sustainability. The general objectives also include improving the social and business environment in aquaculture development, increasing the national consumption of aquaculture products, and increasing the employment in the aquaculture industry, while furthering the development of local communities.

The NSPA also contains indicators of environmental, economic and social sustainability, the description of the expected synergy between research projects and the identification of measures and activities with the objective of aquaculture development and the promotion of aquaculture products. Additionally, in accordance with the European Commission Strategic Guidelines for Sustainable Development of EU Aquaculture[2], the NSPA emphasises the following objectives: simplifying administrative procedures, ensuring sustainable development and growth through coordinated spatial planning and ensuring necessary aquaculture locations, increasing competitiveness, especially by connecting the scientific community and the sector, and creating a fair market competition.

NSPA contains the analysis of the sector and identifies the key gaps and issues that need to be addressed. The activities to be undertaken in reaching the set goals correspond to the results of the SWOT analysis and include a wide range of measures. Croatia sees the development of aquaculture as one of the key activities within the overall development of its coastal economy. The NSPA provides for a vision of development, including activities, measures and sources of financing.

European Parliament and Council Regulation No 508/2014 of 25 May 2014 on the European Maritime and Fishery Fund (EMFF)[3] include a number of measures aimed at financing the development of aquaculture activities. At the same time, adoption of the NSPA is one of the ex-ante conditions in the new programing period. Most of the elements of NSPA implementation are planned for financing from EMFF; however, several of the measures are planned for financing from other ESI funds, with national co-financing.

[1] OJ L 354, 28.12.2013, p. 22-61
[2] COM/2013/229
[3] OJ L 149, 20.05.2014, p. 1-66

2. Introduction

Aquaculture is one of the fastest growing activities in agri-food sector in the last several years, with the average annual growth rate of 6-8%. The majority of this growth is a result of growth in production in Asia (Asia accounted for 89% of the total global production in aquaculture in 2010). At the global level, aquaculture today accounts for almost half of the global supply of aquatic organisms used for human consumption, with the annual production reaching 63.6 million tonnes[4]. Although there is growth in production on the global scale, the production in EU has stagnated in the last several years. Since 2000, the total production in aquaculture in EU-27 has hardly recorded any growth. In 2010, the EU production accounted for only 2.1% of the total global production of farmed aquatic organisms. However, the EU-27 production is not insignificant, totalling at 1.3 million tonnes annually. The biggest producers are France, Spain, Italy, UK and Greece.

While the production at EU level stagnated, imports of fishery products grew almost three-fold in the last several years. The current consumption at EU-27 level totals approximately 12 million tonnes annually, 60% of which is imported. The most important imports are the Norwegian salmon, shrimps from Asia and South America, and freshwater species such as pangasius and tilapia imported primarily from South East Asia. The growth in imports of fishery products is an indicator of the possibilities and potential of the EU-27 (today, EU-28) market; however, at the level of EU aquaculture has not been able to reach production levels which would satisfy the current demand. According to available analysis (2002[5], 2009[6], 2013[7]), the key issues in EU aquaculture development are the inappropriate legal framework, competitiveness of imported products, lack of appropriate financing or access to capital, and the sometimes incorrect or inappropriate perception of aquaculture in the general public. In order to encourage the development of this activity, in 2013 the EC published the Strategic Guidelines for Sustainable Development of EU aquaculture[8], in which it proposes four key strategic elements. Two elements singled out by the Strategic Guidelines refer to the procedure for the granting of permits for aquaculture activity and the issue of spatial planning (accessibility of water/space). Both of these issues are directly related to the legal framework regulating the aquaculture activity.

Until 2013, aquaculture did not form a part of the EU Common Fisheries Policy (CFP). The new basic CFP Regulation from 2013 contains for the first time provisions relating to aquaculture. Article 34 refers to the Strategic Guidelines for Sustainable Development of EU aquaculture, which form the basis for NSPA preparation. The NSPA preparation is obligatory and the NSPA needs to be adopted no later than 30 June 2014. Article 5 paragraph 5 of the Marine Fisheries Act (OG 81/2013, 14/2014 and 152/2014) provides for the adoption of the NSPA in the Croatian national legal framework

[4] SOFIA 2012
[5] COM(2002)0511
[6] COM(2009)0162
[7] COM(2013)229
[8] COM(2013)229

3. Legal and Administrative Framework

a) EU Legislation

The Regulation of the European Parliament and the Council (EU) on Common Fishery Policy of 11 December 2013 does not actually contain provisions obligatory in the sense of regulatory framework that would in any manner be binding for aquaculture. Additionally, the regulation does not contain any references to the granting of permits. Article 34 refers exclusively to the strategic guidelines for common priorities and development objectives of sustainable aquaculture. Although the strategic guidelines are not binding, they do represent the basis for development of multi-annual national strategic plans for aquaculture. In addition to the provisions related to the NSPA, the new basic CFP Regulation also includes aquaculture in the scope of implementation for the areas of financing and market organisation.

Due to the projected importance of aquaculture in reaching the objectives of the general EU development strategy Europe 2020[9], this activity has also been recognised in the second key segment of the CFP, the structural policy and financing. European Parliament and Council Regulation No 508/2014 on the European Maritime and Fishery Fund (EMFF) contain a number of measures aimed at financing the development of aquaculture activities.

The third element of CFP is the common market organisation (CMO). The EP and Council Regulation (EU) No. 1379/2013 of 11 December 2013[10], which replaced the Council Regulation No. 104/2000, envisages an important role of producer organizations (POs) in further development and organisation of the market. The Regulation also contains provisions regarding labelling and consumer information.. This Regulation also defines specific provisions for the objectives of POs in the area of aquaculture (promotion of activities of sustainable aquaculture, ensuring that member activities comply with the NSPA, article 7). For the purposes of reaching these objectives, POs may use a number of measures, and may use financial support from the EMFF for the purposes of implementing their plans.

Aquaculture activities are at EU level also regulated by certain environmental, veterinary, food and feed safety and animal health provisions..

At EU level there is no single mechanism of the process of granting of permits or concessions for aquaculture. Additionally, there is no single mechanism (legal instrument) that regulates spatial planning and integrated management of the coastal area. The integration of all maritime activities, and thus of aquaculture as well, is one of the key elements of the EU Integrated Maritime Policy[11] (IMP) and the Directive establishing the framework for maritime spatial planning The assumption is that by establishing uniform practices of planning and integrating activities, equal and identical conditions may be created in the EU, thereby creating equal starting points in different MS. The Directive[12] specifically lists aquaculture as an activity that needs to be taken into consideration in the spatial planning process.

The set of regulations governing the issues of food safety, veterinary medicine and animal welfare is complex and subject to regular modifications at EU level. The so-called food-package is currently undergoing a reform, which shall once again amend several of the conditions for the implementation of the system for the control of food of animal origin (but also vegetable origin). Regulation (EC) No. 852/2002 on food hygiene is currently still in force.

[9] COM(2010)2020 and European Council Conclusions dated 17 June 2010
[10] OJ L 354, 28.12.2013, p. 1-21
[11] COM(2007)575
[12] OJ L 257, 28.08.2014, p. 135-145

With regard to veterinary medicines, the Directive 2001/82/EC as amended by the Directive 2004/28/EC regulates some issues; however, at EU level there is an issue of availability of veterinary medicines and the issue of regulating their use.

The issues of health and welfare of animals directly related with the aquaculture activity are regulated with the 2006/88/EC Directive and the Regulation (EC) No. 1/2005. The latter does not contain specific provisions relating to aquaculture; however, some of its horizontal elements may influence farming practices.

The greatest number of regulations that directly impact how the activity of aquaculture is performed at EU level comes from the field of environmental protection. The key regulations include the Water Framework Directive (WFD)[13], the Directive on the Conservation of Natural Habitats and Wild Flora and Fauna[14], the Directive on Conservation of Wild Birds[15], the Environmental Impact Assessment Directive (EIA)[16], the Marine Strategy Framework Directive (MSFD)[17], the Directive on Alien and Locally Absent Species in Aquaculture[18] and the Strategic Environmental Assessment Directive (SEA)[19].

The Directive on Habitats and the Directive on Birds together create the framework for the establishment of the Natura 2000 network, and they are equally implemented on both the land and at sea, which may limit the technologies that may be used in aquaculture in the areas encompassed by the Natura 2000 network. From the point of view of aquaculture, the WFD and MSFD refer primarily to issues of water quality. The objective of the MSFD is to safeguard the ecological standards in the maritime environment. The EIA and SEA directives regulate the issues of size and shape of spatial interventions that require impact assessments, that is, create the framework for performing environmental impact assessments when preparing strategic plans for development of a specific activity.

In addition to the legal framework, the EU adopted several strategies of territorial cooperation (macro-regional strategies). Two of them are important for Croatia, EU Strategy for Danube Region (EUSDR) and EU Strategy for the Adriatic and Ionian Region (EUSAIR). Danube macro-regional strategy does not contain specific references to aquaculture, and does not provide specific elements for developing these activities. On the other hand, the Adriatic-Ionian macro-regional strategy, in the framework of the first pillar (Maximising the potential of Blue economy) as one of the key activities identified aquaculture. The strategy emphasizes that this is one of the sectors that can ensure sustainable development and prosperity of coastal areas.

b) National Legislation

The aquaculture activity in Croatia is regulated by a number of regulations. There is no single regulation governing aquaculture, but there is a special chapter within the Marine Fisheries Act (OG 81/13, 14/14 and 152/14) and a special chapter within the Freshwater Fisheries Act (OG 106/01, 7/03, 174/04, 10/05-amendments and 49/05-revised text, 14/14). Based on these acts, there is a number of regulations in force regulating the specific issues of marine and freshwater aquaculture, such as granting of farming permits (licenses), obligation to take a specialized test

[13] OJ L 327, 22.12.2000, p.1-73, with amendments (1216/2001; 0321/2008; 0113/2009 i 0625/2009)
[14] OJ L 206, 22.7.1992, p. 7-50, with amendments (SL L 158, 10.6.2013 0610/1992, 0101/1995; 1128/1997; 1120/2003; 1510/2004 i 1010/2007)
[15] (codified version) (OJ L 20, 26.01.2010.)
[16] OJ L 175, 5.7. 85, p. 40, with amendments (SL L 73, 14.3. 97, p. 5. 3 SL L 156, 25.6.03, p.17.); the draft of amendments to this Directive is currently in the process of being adopted by the EC and the EP.
[17] OJ L 164, 25.6.2008, p.19-39
[18] OJ L 88, 4.4.2011, p.1-4
[19] OJ L 197, 21.7.2001, p.30-37

prior to engaging in aquaculture, determining the criteria for spatial positioning of mariculture, procedures for data collection in aquaculture, the farming of tuna, market standards, procedure for setting up of fisheries cooperatives and POs. Based on the Environmental Protection Act, a special ordinance has been adopted regulating the introduction of alien species in farming, while pursuant to the Organic Production Act an ordinance on the organic production in aquaculture has been adopted.

Croatia implements all EU regulations in the area of aquatic animal health with the objective of maintaining or establishing a favourable health status of fish and shellfish farms. The key document serving as the basis for the implementation of measures in the area of aquatic animal health is the Directive 2006/88/EC. On the basis of the legislation currently in force, the programmes of control are implemented for diseases that are subject to reporting for carp and trout species. However, the issue of the diseases of Mediterranean species has not been adequately regulated, although in Croatia the production of marine fish is the largest and most profitable branch of aquaculture.

The list of the most important legislation is presented in Table 1.

Table 1: List of national regulations

Regulation Title	Official Gazette (No.)
Marine Fisheries Act	81/13, 14/14, 152/14
Freshwater Fisheries Act	106/01, 7/03, 174/04, 10/05-amendmends added and 49/05-final version, 14/14
Ordinance on Ecological Production in Aquaculture	153/11
Ordinance on Permits for Farming of Fish and Other Marine Organisms	76/11
Ordinance on the Logbook on Farming of Fish and Other Marine Organisms	76/11, 52/12 and 16/13
Ordinance on the Examination for Performing the Activity of Farming of Fish and Other Maritime Organisms	76/11
Ordinance on the Suitability Criteria of a Maritime Domain for Farming of Fish and Other Maritime Organisms	59/12
Ordinance on Catching, Farming and Trading in Tuna (*Thunnus thynnus*), Swordfish (*Xiphias gladius*) and Sailfish (*Tetrapturus belone*)	03/15, 11/15
Ordinance on Aquaculture	82/05, 59/09, 156/09, 53/10, 03/11 and 149/11
Ordinance on Market Standards for Specific Fishery Products	37/10
Ordinance on Consumer Associations in the Fishery Sector	41/10
Ordinance on Determining the Rules for the Calculation of Subsidies for Consumer Associations in the Fishery Sector	65/12

Ordinance on Fisheries Cooperatives	48/10
Ordinance on the Method of Development and Implementation of a Study on the Evaluation of the Introduction Risk, Repeated Introduction and Farming of Wild Species	35/08
Veterinary Act	82/13
Veterinary and Medicinal Products Act	84/08
Ordinance on Animal Health Conditions applied to Aquaculture Animals and Their Products and on the Prevention and Suppression of Specific Diseases of Aquatic Animals	42/08
Ordinance on the Measures for the Prevention and Suppression of Specific Diseases of Aquatic Animals	23/10
Ordinance on the Conditions for Trade and Import of Aquaculture Animals and Their Products and on the List of Vector Species	5/10
Ordinance on the Quarantine Conditions for Aquatic Animals	58/12
Ordinance on the Guidelines for Programmes of Control of Animal Health based on Risk Assessment	88/10
Regulation on development and implementation of documents of the Strategy for Marine Environment and Coastal Area Management	112/2014

c) Administrative Procedures

- ***Marine Aquaculture***

The flow chart explaining the steps described in this chapter is provided in Appendix 2. Generally, the issuance of a farming licence (both in freshwater and marine aquaculture) consists of several procedures before several administrative bodies. The overall procedure includes:

- the local (regional) government, and in the case of a protected area (a national park or special nature reserve) the Government of the RC and the Ministry of Maritime Affairs, Transport and Infrastructure, which is competent for concessioning of maritime areas (domains);
- Ministry of Environmental and Nature Protection or the competent body of the local (regional) government which implements the regulations related to environmental and nature protection;
- Ministry of Agriculture which grants a Permit for the farming of fish and other maritime organisms

The first step in the procedure is to register a legal or natural person (company or craft) for the purposes of performing the aquaculture activity. The registration has to be done with the competent Commercial Court in case of a legal entity, or with the competent local government authority in the home county in case of a craft.

The next step is to select a location for farming by accessing the spatial planning documentation under the competence of the regional (local) government (hereinafter: county), or the Government of the RC if the planned area is located in a national park or a special reserve. If the

potential farming area is provided for in the spatial plan, the procedure of granting of a concession is initiated, for which a location permit is required.

The location permit is an administrative act issued by the competent administrative body of the county and which is issued on the basis of the Spatial planning Act (OG 153/13), in accordance with special regulations depending on the designated purpose of the area. For the purposes of the granting of a location permit it is necessary to submit a detailed project developed in accordance with the spatial plan on the basis of which the permit shall be granted, as well as the decision on the acceptability of the intervention for the ecological network issued by the Ministry of Environmental and Nature Protection.

The Ministry of Environmental and Nature Protection issues a decision on the need of implementing the procedure of environmental impact assessment of the intervention based on the criteria stipulated by the Environmental Protection Act (OG 80/13) and the Regulation on the Environmental Impact Assessment of Interventions (OG 61/14), as presented in Table 2. Furthermore, in accordance with the provisions of the Environmental Protection Act (OG 80/13), the assessment of the suitability of the intervention for the ecological network (ASIEN) is performed for the intervention or its parts which, by itself or in conjunction with other interventions may have a significant negative impact on the objectives of the protection and integrity of the Natura 2000 ecological network. The Ministry of Environmental and Nature Protection implements the ASIEN for the interventions for which the same Ministry implements the procedure of the environmental impact assessment or a procedure for the evaluation of the need for an environmental impact assessment pursuant to the Regulation on the Assessment of the Environmental Impact of the Intervention as well as for the interventions in protected areas categorised as national parks, nature parks or special reserves. The administrative body of the local (regional) government implements ASIEN for the interventions for which the administrative body of the local (regional) government implements the environmental impact assessment procedure or the procedure for the evaluation of the need for an environmental impact assessment pursuant to the Regulation on the Assessment of the Environmental Impact of the Intervention or for interventions included in the following protected areas: a regional park, an important landscape, a forest-park, a natural monument and a park architecture monument, and for interventions which are performed in an area which is not a protected area.

After obtaining the location permit, the county or the Ministry of Maritime Affairs, Transport and Infrastructure, on behalf of the Government of the RC and with previous consent by the Ministry of Agriculture, initiates the procedure of the granting of the concession. Upon the completion of the procedure, the county prefect, or the minister acting on behalf of the Government of the RC, sign the Concession Agreement for a maritime domain for a maximum duration of 20 years with the interested party. It is important to emphasize that on the basis of the current legal framework the concession may not be extended automatically, except in the case of economically justified new investments, but that upon the expiration of the concession period the producer shall enter a new tender procedure, in which they shall not be given priority in the granting of the new concession for the same farming area. In the area of these concessions placed and anchored are installations for breeding (floating cages for fish or shellfish pergolas), which due to technology and the continuity of the breeding process cannot be removed, at the time when at the expiration of the concession, a new procedure for the concession is implemented. It is necessary to create legal conditions for the concessionaire that meets all the requirements stipulated in the concession agreement to allow him the extension of the contract without the implementation of the new procedure and without compromising existing production. The cultivation of marine organisms involves a cycle that lasts two to three years, which means that at any moment at the farm there is more breeding generations, that is there is always a large amount of breeding organisms that have not yet reached commercial value. It is extremely important to keep the concessioning of the maritime domain for the purpose of aquaculture, at the county level, given that the lowest level of demarcations on maritime domain is county demarcation and it cannot descend to a lower

organizational level (eg. municipality). In the interests of sustainability and further development of this activity, it is important to ensure the safety of investments, which is possible only in the case when the activity is planned and long-term regulated at the county level, while in the case of strategically important investment concessioning of the maritime domain for the purpose of aquaculture should be addressed at the state level.

The abovementioned procedures are followed by the procedure with the Ministry of Agriculture - Directorate of Fisheries, which is competent for the granting of licences for farming of fish and other marine organisms. On the basis of the concession agreement for a maritime domain and the decision on the environmental impact, the Directorate of Fisheries defines the farming area, the species and the quantities of fish and other marine organisms that may be farmed. In case of farming of strictly protected species, species that are locally absent or alien species, the condition for the granting of the farming licence is also the consent from the ministry competent for environmental protection. In accordance with the concession agreement, the farming licence shall be issued for a maximum duration of 20 years. However, on the basis of the current practice, the average duration of a concession agreement, and consequently the period in which the farming licence is valid, is 15 years.

The total duration of the whole procedure, before all administrative bodies in accordance with the stipulated deadlines and dependent on the complexity of the intervention, primarily the need for the preparation of an environmental impact assessment and the evaluation of the acceptability of the intervention for the ecological network, is from 3 months to 2 years.

In the 2007-2013 period, the Directorate of Fisheries issued 428 permits. Of the 430 submitted applications, a positive decision was issued for 428, with a success rate of 99.53%. The high success rate for resolving the applications for the granting of licences is the result of an effort on the part of the Directorate of Fisheries put into vertical and horizontal connection and coordination of administrative bodies involved in the procedures of issuance of concessions on maritime domain (areas).

Table 2: Criteria stipulated by the Directive on the Environmental Impact Assessment (OG 61/14)

INTERVENTIONS REQUIRING AN ENVIRONMENTAL IMPACT ASSESMENT
1) Maritime farms:
a) fish farms in the coastal protected marine area (CPA) with an annual production of more than 100 t
b) fish farms outside of the CPA, at a distance of less than 1 NM from the coast with the annual production of more than 700 t
c) fish farms outside the CPA, which are at a distance of more than 1 NM from the shore of an island or mainland with the annual production of more than 3.500 t
2) A CPA mariculture zone planned for more fish farms
3) A CPA shellfish farm with the annual production of more than 400 t
THE PROCEDURE FOR EVALUATING THE REQUIREMENT FOR AN ASSESSMENT OF THE ENVIRONMENTAL IMPACT
1) fish farms in the coastal protected marine area (CPA) with the annual production of less than 100 t

- ***Freshwater Aquaculture***

The flow chart explaining the steps described in this chapter is provided in Appendix 3. The process includes the following state administration bodies:

- local (regional) government, competent for granting of location permits;

- Agricultural Land Agency, which performs the procedure related to use of agricultural land owned by the RC and the use of water for the purposes of farming fish and other aquatic organisms;
- Croatian Waters (company), competent for stipulating special conditions for the use of waters in the procedure of obtaining the rights for usage of fresh water;
- The Ministry of Environmental and Nature Protection which implements the procedures related to the environmental and nature protection, except in cases when the procedure of the environmental impact assessment and the procedure of the Evaluation of the acceptability of the intervention for the ecological network is performed by the local (regional) government;
- Ministry of Agriculture, which issues the aquaculture licence (permit).

The basic prerequisite in the procedure of the granting of permits for performing the activity of freshwater aquaculture is the registration of the activity with the Commercial court in case of legal entities, or with the competent body of the local administration in the home county in case of a natural person (a craft).

The next step is granting of a location permit, or a corresponding act proving the compliance of the planned intervention with the spatial planning documentation. On the basis of the criteria stipulated by the Regulation on the Environmental Impact Assessment (OG 64/2008, 67/2009), as presented in Table 3, as part of this procedure the appropriate procedures shall be performed for the environmental impact assessment which are within the competence of the Ministry of Environmental and Nature Protection. Furthermore, pursuant to the relevant provisions of the Environmental Protection Act (OG 80/13), the acceptability assessment of the intervention for the ecological network (ASIEN) is performed for the intervention or its parts which, by itself or in conjunction with other interventions may have a significant negative impact on the objectives of the conservation and integrity of the Natura 2000 ecological network. The Ministry of Environmental and Nature Protection implements the ASIEN for the interventions for which the same Ministry implements the procedure of an environmental impact assessment or a procedure for the evaluation of the need for an environmental impact assessment pursuant to the Regulation on the Environmental Impact Assessment, as well as for the interventions in the protected area categorised as national parks, nature parks or special reserves. The administrative body of the local (regional) self—government implements the ASIEN for the interventions for which the administrative body of the local (regional) government implements the procedure of an environmental impact assessment or the procedure of the evaluation of the need for an environmental impact assessment pursuant to the Regulation on the Environmental Impact Assessment of an Intervention, in the cases of the following protected areas: a regional park, an important landscape, a forest-park, a natural monument or a park architecture monument, and for interventions which are performed in an area which is not a protected area.

The use of agricultural land and water for the purposes of freshwater aquaculture is regulated by the Water Act (OG 153/09, 63/11, 130/11, 56/2013, 14/14) and the Agriculture Land Act (OG 39/2013). In the last several years, this legal framework has been amended and harmonized several times, all for the purpose of establishing a more efficient implementing mechanism. For this purpose, when fresh waters are used for fish farming, instead of issuing a concession, the right shall be granted for the use of freshwaters through special procedures, depending on the status of the land where the farm is located. Farms that are located on agricultural land owned by the RC are leased for 50 years by public tender. Within the same procedure the right for the use of freshwaters at the respective farms is gained over the same period of time. Agricultural Land Act prescribes the possibility of disposing of state ponds in the form of temporary use for a period up to five years, or until creation of the conditions for the award of the same ponds in the 50-year lease. In cases of farms located on land that is property of natural or legal persons, the procedure for gaining the right for the use of freshwater for farming fish and other

aquatic organisms is implemented. On the basis of current practices, this right is gained for a period of 20 years. All of the abovementioned procedures are implemented by the Agricultural Land Agency, while the Croatian Waters is included in the procedure of gaining the rights for the use of freshwaters, by stipulating special conditions for their use.

The contracts on the lease of fish ponds, as well as the contracts on the gaining the right for the use of fresh waters for fish farming purposes, concluded between legal or natural persons and the Agricultural Land Agency, are legal alternative for the concession contract for the use of fresh waters. This contract forms the basic document for the aquaculture license issuing procedure at the Ministry of Agriculture, Directorate of Fisheries, pursuant to the Freshwater Fisheries Act (OG 106/2001, 7/2003, 174/2004, 10/2005, 49/2005, revised text, 14/2014). The aquaculture license is issued for the period for which the contracts are concluded on the basis of special regulations on waters and agricultural lands, which in case of fish ponds owned by the RC is 50 years, while in other cases this period is shorter and as a rule is 15 to 20 years. In case of farming of strictly protected species, alien or locally absent species, the condition for aquaculture license issuing is the consent by the ministry competent for environmental protection.

The duration of the administrative procedures for the granting of aquaculture licences (permits) is dependent on the complexity of the intervention and on the deadlines stipulated by the individual administrative bodies. Due to the abovementioned amendments to the legislative framework, and the consequent changes in competences of the administrative bodies included in the procedure, by the end of 2013 the abovementioned procedures which directly precede the granting of an aquaculture permit lasted more than one year. The establishment of the new legal framework related to the use of agricultural land and waters for the purposes of aquaculture from August 2013, is expected to shorten the duration of the procedures implemented by the Agricultural Land Agency with regard to the leasing of the fish ponds to 3 months, as compared to 6 to 12 months as was the case, while with regard to the procedure of the gaining the rights for the use of freshwaters the process shall last no longer than 6 months.

The licencing procedure for performing the activity of freshwater aquaculture with the Ministry of Agriculture Directorate of Fisheries has the completion date of one month from the date of submitting the complete request by a legal or natural (a craft) person. In the 2007-2013 period, the Directorate of Fisheries issued 46 freshwater aquaculture permits, with a success rate of approximately 90%. The positive issuing of other submitted applications is expected upon the completion of prior procedures related to the use of agricultural land and waters pursuant to the special regulations.

Table 3. Criteria stipulated by the Regulation on the Environmental Impact Assessment (OG 61/14)

THE EVALUATION PROCEDURE OF THE REQUIREMENT FOR ENVIRONMENTAL IMPACT ASSESSMENT
Freshwater farms: − for salmonid farms with the annual production of 10 t or more - for cyprinid farms with the area of 100 ha and more
THE EVALUATION PROCEDURE OF THE REQUIREMENT FOR AN ENVIRONMENTAL IMPACT ASSESSMENT WHICH IS UNDER THE COMPETENCE OF ADMINISTRATIVE BODY IN THE COUNTY OR IN THE CITY OF ZAGREB
Freshwater farms: − for Salmonidae, with the annual production of more than 5 t − for Cyprinidae farms with the area of 50 ha or more

- ***Spatial Planning***

The consequences of aquaculture planning are spatial interventions that may already exist or are planned. Defining a spatial intervention, that is, allocating an area for the purposes of a specific intervention is performed on the basis of regulations governing spatial planning and construction, that is, the Spatial planning Act (OG 153/2013) and the Building Act (OG 153/2013). On the basis of these acts, the investor may realise the right to an intervention classified as the construction of a building (used in aquaculture) only on the basis of a legally binding resolution on the construction conditions, a construction permit, an approved main project, or without an administrative act in case the construction does not require such an act based on a special regulation. (Ordinance on Simple Buildings and Construction Works, OG 21/09, 57/10. 126/10, 48/11, 81/12 and 68/13). The right to an aquaculture intervention and the corresponding spatial infrastructure is based on the allocation status of the area in the spatial plans of the regional and local administration.

Marine farms are farming installations connected into a technological whole, which for the duration of the spatial intervention may be located only at a stipulated location (areas). Marine farms (cages or lines as well as the corresponding floating facilities and installations) are anchored and as such may not be considered buildings in the sense in which buildings are defined in the Building Act, and the intervention may be performed only on the basis of a location permit.

For the purposes of planning the aquaculture project in a maritime domain or in a coastal area, the manner in which the Building Act regulates the protected coastal areas of the sea (PCA) shall be taken into consideration. In the CPA, the coastal area to the distance of 1000 m from the shoreline and the marine area to the distance of 300 m from the shoreline are defined as a restricted area. Within a CPA there is a ban on tuna farming. Within a restricted area, a building with a (gross) area of 30m^2 may be built for the purposes of a natural or a legal person registered for mariculture in a maritime domain owning a maritime domain concession for the use of a marine area of at least 10.000 m². Additionally, buildings intended for the purposes of the mooring of vessels for the purpose of mariculture may be planned, as well as the construction of buildings that due to their characteristics require an onshore location. This implies marine farms and hatcheries, which due to the required proximity of the intervention and sea water drainage require a location near the sea.

The availability and the quality of the available space for aquaculture are defined by the spatial plans. The aquaculture planning needs to be performed at the level of the county spatial plans, since the lowest level of demarcation in a maritime domain is a border between counties.

The planning of maritime domain use for aquaculture purposes is immediately faced with the conflict between the existing and potential users of the maritime domain when realising their interests for the coastal area use. Due to the conflict of interests in the coastal area, the aquaculture interventions are most often planned for more exposed locations, where other activities may not realise their interests. Performing the intervention at more exposed locations strategically defines both the size of the investment and the investor's financial ability, that is, favours larger investments over smaller ones. The most common mistake in planning such an aquaculture development concept is the indeterminacy with regard to the coastal infrastructure that shall follow large investments at more exposed locations. The coastal infrastructure for the purposes of marine farming is proportional in size to the size of the constructed farm, which in turn is proportional to the location exposure gradient. The infrastructure shall be located at a reasonable distance from the location of the farm, which in turn increases the competition for the use of the coastline. The consequences thereof are the half-complete spatial plans that explicitly designate farming areas, but are insufficient to attract the investors. A new farming category is the farming of marine organisms on land in tanks with a water recirculation system. The spatial plans also need to enable the positioning of this interesting activity.

The planning of the allocated area for the purposes of land aquaculture has two different aspects, the planning for the development of farming of marine organisms and the planning for the development of farming of freshwater organisms.

The most significant part of the land for aquaculture in the coastal area refers to the harbour and the pier for vessels, as well as for the construction of the land based farms. In general, in the RC there is a lack of harbour infrastructure for the needs of fisheries and, consequently, for the needs of the development of marine aquaculture. In addition to the abovementioned competition for space, the configuration of the eastern Adriatic Coast limits land based farms for marine organisms to hatcheries and farms for earlier development phases (ongrowing) of farmed organisms. This implies a need for smaller areas that those which would be necessary for farming to a final product; however, even these are insufficient to encourage development in this area.

In the Republic of Croatia, spatial planning is within the competence of the local (regional) government (county), and since each county has its own development strategy, the spatial plans differ from one county to the other. Defining the areas for farming in spatial plans has not been developed to the same extent in all the counties.

The best example of planning the areas for marine farming is the spatial planning of the Zadar County which, through the procedure of the integrated coastal zone management, designated four types of areas for farming activity, pursuant to the Ordinance on the Criteria for Suitability of Maritime Domain Parts for Farming of Fish and Other Marine Organisms:

- Areas designated for farming where any other newly planned activity may not be harmful for farming conditions (Z1)
- Areas in which farming has high priority, but with other activities also allowed (Z2)
- Areas where, under certain conditions, limited types of farming are allowed and where farming is an addition to other more dominant activities (Z3)
- Areas not suitable for farming

A Z1 farming area is an example how to manage an area in which farming activity is a priority in the best manner. An area defined in such a manner is designated on the turn key principle because the county prepared all necessary documentation related to the provisions on environmental and nature protection, as well as a location permit. Since these procedures take up the most time, the procedure of the granting of concessions has been significantly shortened. Due to the highly simplified administrative procedure, this method of planning an area for farming is the best practice for the development of aquaculture in a specific area. The Zadar County prepared this method of planning because aquaculture was recognised as an important promoter of county economic development in the County development strategy.

Another positive example is the Šibenik-Knin County where there are a large number of farmers in a single area. The County implemented an efficient manner of managing this area by preparing common documentation related to the regulations on environmental and nature protection, that is, the granting of a unique location permit. By having the documentation already prepared, the Šibenik-Knin County has simplified to a maximum extent the procedure for the granting of permits for new farmers, as well as enabled sustainable economic development of the area while fulfilling all conditions of environmental and nature protection.

Another similar example of the best practices is the area of Malostonski Bay and Malo More in the Dubrovnik-Neretva County, where there is also a great number of farmers located in a single area. In this case, the area in question is a protected area for which the Government of the RC prepared all necessary documentation related to the regulations on environmental and nature protection, that is, issued a single location permit for the entire area. In this manner, a relatively quick and simple process of the granting of permits was enabled as well as contributing to a sustainable economic development of the entire area.

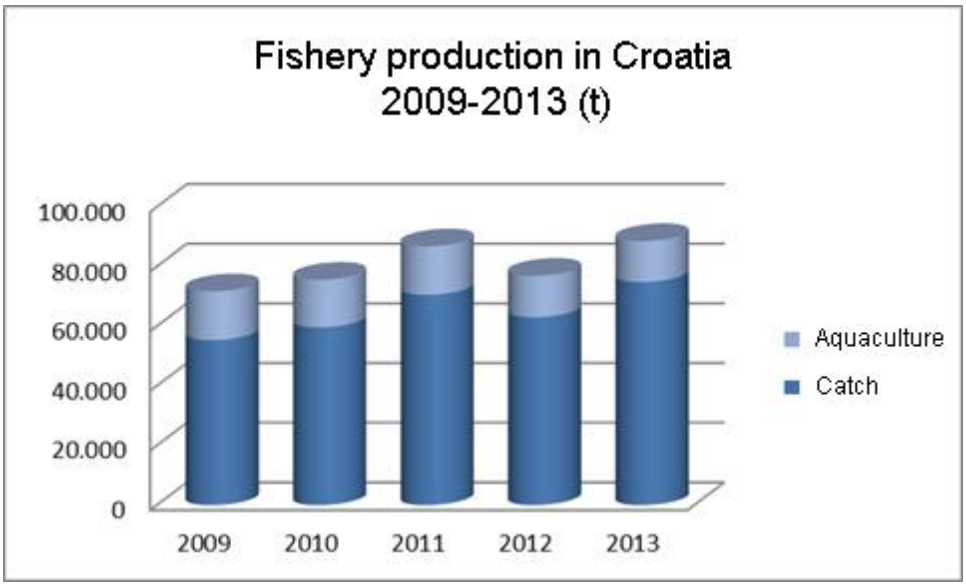
Among the important strategic elements of the further development of freshwater aquaculture is also providing the necessary spatial capacities, both for the farming locations and for the purposes of ensuring the required quantities of water of appropriate quality. The farming of freshwater organisms is connected to the existing waterways, accumulations, natural water surfaces and the constructed farms. Initiating the farming of freshwater fish in the existing water surfaces, but also on agricultural and construction land requires an evaluation of compliance with the spatial plans. If they were not used for aquaculture, a change in their allocation status shall be performed. In cases of constructed farms where the activity of aquaculture was stopped, the interventions for the purposes of putting the farms back into function may pose an issue.

Spatial planning of the areas for freshwater aquaculture differs greatly from one county to the other, that is, it has not been developed to the same extent in all the counties. Some counties thus define areas designated for the activity of freshwater farming, while in others the spatial plans only designate the potential locations as water surfaces, while still other counties do not plan the locations for performing this activity. Since spatial planning is an important element in the procedure of the granting of permits for freshwater aquaculture, and since the compliance of the intervention with the spatial plans is an important condition for granting specific rights, such as the right for the use of water, more effort shall be put into further defining the areas designated for the purposes of the activity of freshwater aquaculture, as well as into coordinating and harmonising the conditions within the spatial planning framework.

4. National Situation and SWOT

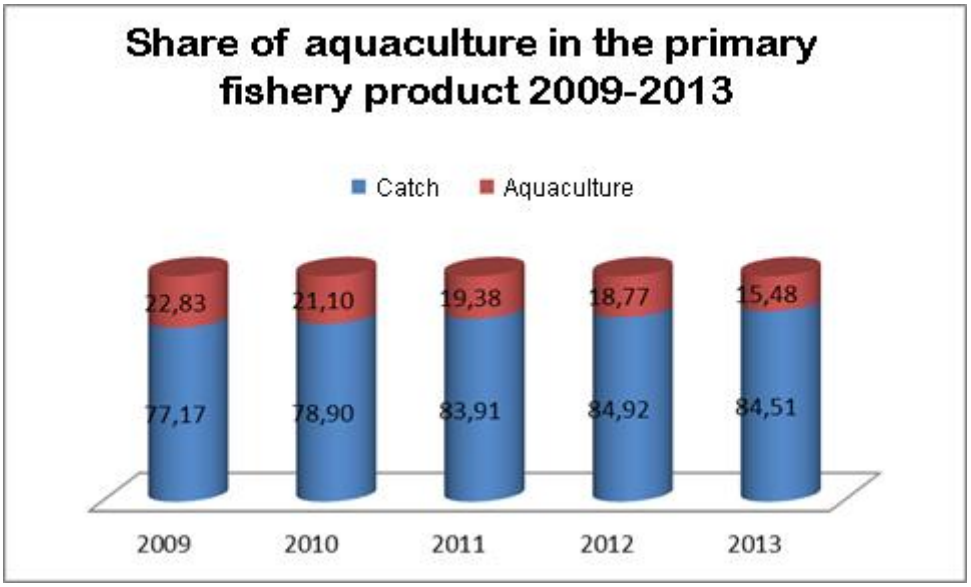
In the previous five-year period the aquaculture production showed a growth trend until 2011, after which there was a decline in 2012, and again increase in 2013, mostly because of a decline in tuna production due to fishing restrictions, and also for a decline in freshwater production. The share of aquaculture in the total fishery production (primary production) by 2010 exceeded 21%, which is above the EU average of 20.4%. In the last two years the share decreased to 19%, mostly due to the decline in tuna production, but also due to the growth in catch.

Graph 1: Fishery production in Croatia 2009-2013 (t)



Source: MA

Graph 2: Share of aquaculture in primary fishery product in Croatia 2009-2013 (t)

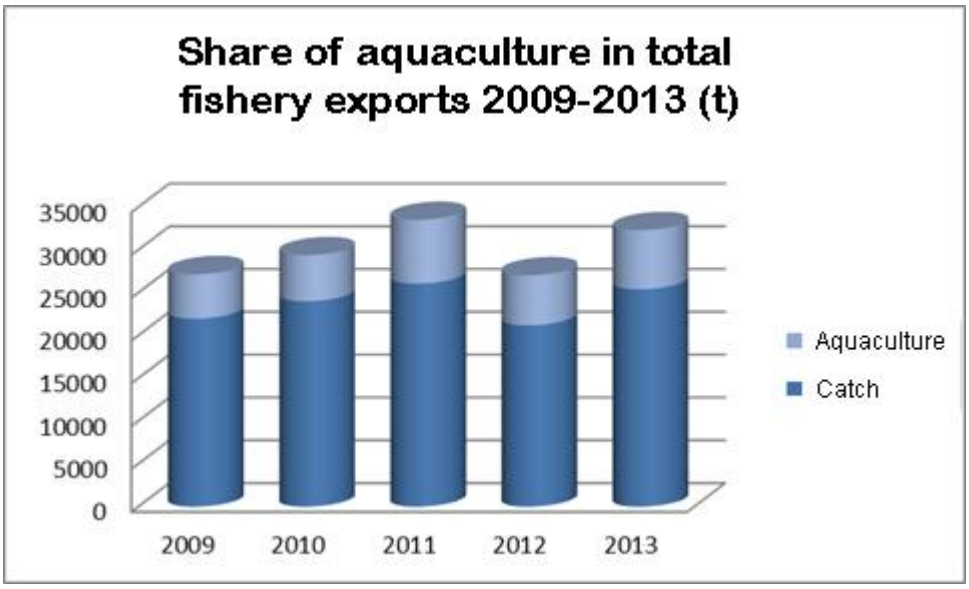


Source: MA

In the same period, the exports of aquaculture products increased, reaching the maximum of 7,440 tonnes in 2011. In 2012 there was a decline in exports, due to the fall in tuna farming. The

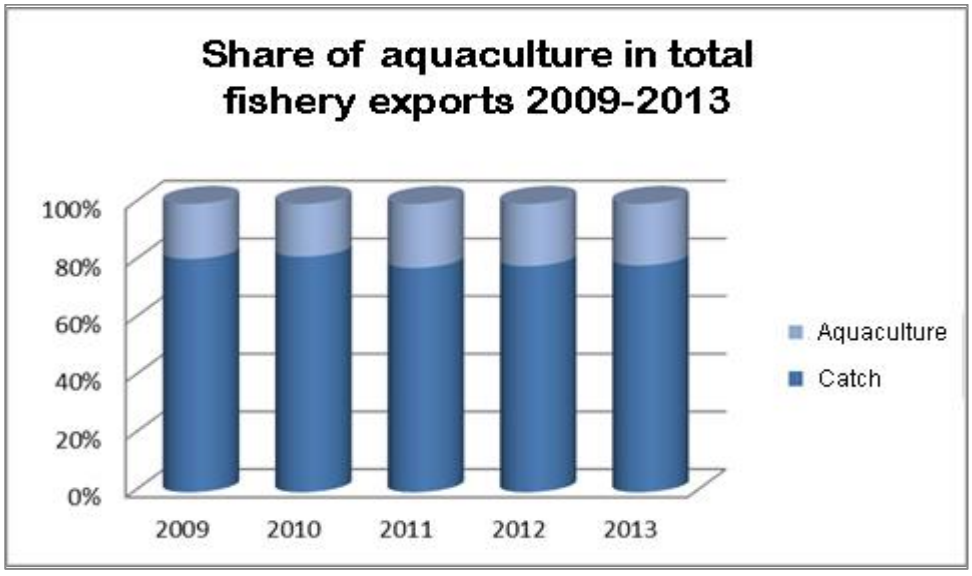
share of aquaculture in the total exports of fishery products (total production) has been growing continuously and in the last two years amounted to 22%.

Graph 3: Share of aquaculture in total fishery exports 2009-2013 (t)



Source: CCE

Graph 4: Share of aquaculture in total fishery exports 2009-2013 (%)

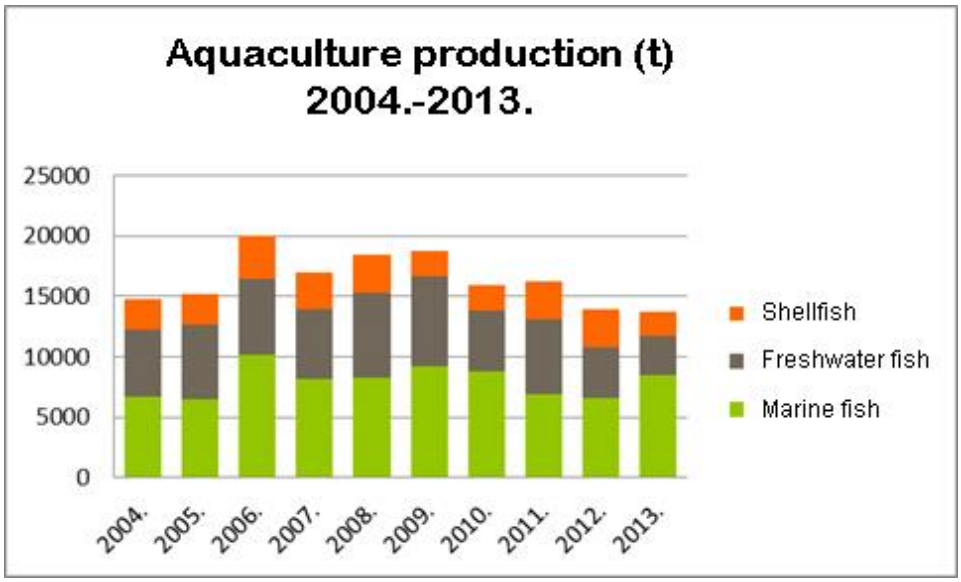


Source: CCE

By analysing the 2003 – 2013 period it is evident that the total production in aquaculture was approximately 15 000 tonnes until 2006 when it grew to over 20 000 tonnes – mostly due to the growth in tuna farming. Afterwards, due to the restrictions on tuna fishery, the production decreased to between 17 and 19 000 tonnes, and finally to 13,703 tonnes in 2013. Freshwater farming reached a maximum of more than 7 000 tonnes in 2008 in 2009, after which it decreased to 3.235 tonnes in 2013. For the most part, this decrease in the production in the farming of warm water species was caused by the new statistical method (in the new statistical system data on production which was

placed on the market is presented). There was also a decline in the farming of cold water species, which is considered real.

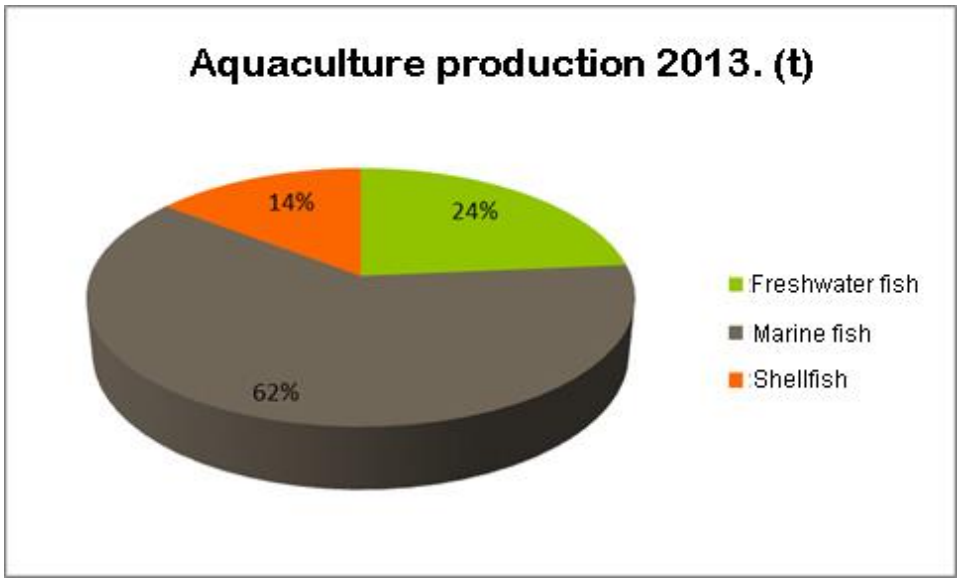
Graph 5: Aquaculture production in Croatia 2004-2013 (t)



Source: MA

With 62% of production, marine fish has the largest share in the total aquaculture production in 2013, with the share of freshwater fish of 24%, and the share of shellfish of 14%.

Graph 6: Aquaculture production in Croatia 2013 (t)



Source: MA, CCTC

A detailed analysis of the production, exports as well as other analyses and trends are presented in Appendix 1.

a) Mariculture

Mariculture in Croatia has a long tradition. The farming of shellfish started several centuries ago, while there was a great upswing in production during the last century. Fish farming started

amongst the first in Europe, and has a tradition of almost 40 years. RC was also one of the first countries in Europe where tuna were farmed, starting in the 1990s. In addition to the advantage of highly favourable environmental conditions which contribute to the development of this activity, Croatia benefits from numerous experts both in the area of animal farming and in the educational as well as the scientific and research community focusing on mariculture, or being connected to it in various manners. The activity of mariculture significantly contributes to the conservation of sensitive island communities, where it has been fully accepted in the society and where it is one of the rare activities which provide full employment all year around. Mariculture also contributes to the development of accompanying activities, which has a positive effect on keeping the working population on the islands, while also contributing to the development of tourist activities.

In RC, mariculture includes farming of fish and shellfish. In 2013 there were a total of 148 registered farmers, of which 117 were shellfish farmers, 30 were fish farmers including 4 tuna farmers. The farming was performed at a total of 330 locations, of which 257 are locations for shellfish, 45 are locations for the fish, 10 are polyculture locations (farming of fish and shellfish), 14 locations for tuna farming and 4 locations for fish hatcheries.

It is important to emphasize that when preparing the spatial plans for all of the farms of marine organisms in the RC, all the standards of environmental and nature protection was respected.

The total production in mariculture in 2013 was 10.474 tonnes, of which there were 2,826 tonnes of sea bass (*Dicentrarchus labrax*), 2,978 tonnes of gilt-head bream (*Sparus aurata*), 44 tonnes of meagre (*Argyrosomus regius*), 6 tonnes of common dentex (*Dentex dentex)*, 4 tonnes of trout (Oncorhynchus mykiss) bred in sea, 1950 tonnes of Mediterranean mussel (*Mytilus galoprovincialis*), 50 tonnes of the European flat oyster (*Ostrea edulis*) and 2616 tonnes of Atlantic bluefin tuna (*Tunnus thynnus*) (Table 4). The species predominately farmed are the European seabass, gilt-head bream and tuna.

The production of the European seabass and the gilt-head bream exceeds 5,000 tonnes per year. The farming is performed in floating cages using modern technologies and includes a fully closed farming cycle, from controlled spawning to a market-size product. The farming is performed in almost all the coastal counties; however, it has a largest share in the total production in the Zadar County. The majority of the farmed fish is placed on the national market and the EU market (Italy). In the last several years there was a constant growth in the production of these species, due to the increase in the consumption on the national market, as well as the stabilisation of the prices at the EU market. The production of the European sea bass and the gilt-head bream juveniles is performed in land-based hatcheries, with approximately 20,000,000 juveniles produced annually. This production covers less than 50% of the needs of the installed farming capacities, so a great part of juveniles is imported from Italy and France. In order to lower the possibility of disease transfer and ensure sustainable development of the activity, while also bearing in mind the needs of the national farmers, the building of new hatcheries, as well as the modernisation of the existing ones, is required. Apart from the juvenile fish, fish food and equipment are also imported, which presents a significant additional burden for the farmers. Present production has still not reached the capacities which would make profitable the construction of a fish feed factory in RC, while the existing facilities for the production of cattle fodder have not up to now shown any interest for investing into the production of fish feed. The lack of appropriate coastal infrastructure is also an issue. One of the possibilities for future development of sea bass and gilt-head bream farming, as well as of new species, is farming in closed land-based recirculation systems, where both the on-growing farming phases and the consumption size farming may be performed. After successful initial researches, the primary focus is the development and commercialization of a technology that is able to produce fish and other aquatic organisms on a competitive economic basis.

Tuna farming (*Thunnus thynnus*) is performed in floating cages on semi-open and open areas of the middle Adriatic, in the area of the Zadar County and the Split-Dalmatia County. Farming is based on capture of small tuna (8-10 kg) that are then farmed until they reach the market

size (30 or more kg). Almost the entire tuna production is placed on the Japanese market where in addition to the provision of additional financial resources as well as reducing the risk of operations for the improvement of this production is likely long-term increase in production volumes.. In the last several years there has been stagnation in production due to the restrictions placed on tuna fishery.,. Future increases of catch quotas is based on the ICCAT ‘s increase of catch quotas in the next three years. taking into account the already proven performance measures for the protection of this species in the Mediterranean is expected continued recovery, and hence increase in the quota up to 2020. At the same time, significant effort is made in the development and research projects whose objective is to ensure the closing of the tuna farming cycle. The total permitted farming capacity of the existing farms exceeds 7,000 tonnes per year, which represents a significant unused potential.

Farming of shellfish is performed in production areas continuously monitored by the state (monitoring of water quality). In the RC the Mediterranean mussel (*Mytilus galoprovincialis*) and the European flat oyster (*Ostrea edulis*) are farmed, using traditional farming technology of floating parks. Oysters are for the most part farmed in the area of Malostonski Bay and Malo More, while mussels are mostly farmed in the area of the western coast of Istria, the area of the river Krka estuary, and in Novigrad Sea. The farming process is based entirely on the collection of immature shellfish from the sea, since there are no shellfish hatcheries. Approximately 2.000 tonnes of the Mediterranean mussel and approximately 10 tonnes of the European flat oyster are produced annually. Since there are no shellfish hatcheries, there is a need to build the required facilities and adopt the necessary technologies for the purposes of production of fry of oysters and other commercially interesting species. The conservation of traditional method of farming oysters in the Malostonski Bay represents a challenge for adding greater value to the final product with regard to protecting its origin and developing a specific marketing strategy, while farming of mussels requires implementation of new technologies. With regard to the production intensity and the natural characteristics of most of the areas where shellfish are farmed, there is an additional potential in taking up the activity of ecological farming.

In the Lika-Senj County there are two rainbow trout (*Oncorhynchus mykiss*) farms at sea in which test production was performed, with farms consequently planned to be built in three additional locations. It is important to emphasize that these locations for trout farming are included in the Lika-Senj County spatial plan on the basis of expert background studies. Until now there was just minimal commercial production (4 tonnes in 2013); however, the required steps are being taken in order to provide the required locations for the purposes of closing the complete farming cycle, from spawning to the production of a final product. Since rainbow trout is not an indigenous species in Croatia, farming shall be performed in accordance with the existing legal regulations governing environmental protection and the introduction of new species for farming purposes.

The total production in mariculture in the 2004 – 2013 period is presented in Table 4.

Table 4: Production in mariculture (t) for the 2004 – 2013 period

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Sea bass	2100	2000	2400	2800	2500	2800	2800	2775	2453	2826
Gilt-head bream	800	1000	1050	1150	2000	2200	2400	1719	2173	2978
Mussel	2400	2500	3500	3000	3000	2000	2000	3000*	3000*	1950
Oyster	40	50	50	50	50	50	55	150*	150*	50
Tuna	3777	3425	6700	4180	3711	4200	3592	3223	1907	2616
Meagre							2	39	24	44

Diplodus							0.65			
Dentex									0.037	6
Trout										4
TOTAL	**9117**	**8975**	**13700**	**11180**	**11261**	**11250**	**10849.65**	**10906**	**9707.037**	**10474**

*Source: MA, CCTC**

In mariculture of RC there are several horizontal issues, regardless of the species of the organism farmed. In order to ensure the required space and avoid potential conflicts in the sensitive coastal areas, RC has defined specific criteria for determination of zones in which mariculture is to be performed. Using the methods of integrated coastal zone management, several coastal counties have designated mariculture zones within the framework of the spatial planning process, with the same methods expected to be implemented in other counties spatial plans. Such an approach is in accordance with the implementation of the elements of the integrated maritime policy, within the framework of which the integration of various economic activities may contribute to the total growth and the sustainable development of coastal areas. With regard to the significance of the elements of the integrated maritime policy in the following period, it is expected that mariculture shall be the activity that shall provide an impetus for the development of the entire fisheries sector.

Overall, there is an insufficient diversification of products and farmed species. Another issue is the fact that there are no registered mariculture producers' organisations, as well as established communication lines with consumers for the purposes of informing the public on the advantages of mariculture products and improving the perception and acceptance of this product by the consumers.

An important issue in aquaculture are the diseases of farmed organisms. Only a limited number of medicines is registered on the RC market, which causes the need for frequent use of same medicines and the possibility of disease causative agents developing resistance to the available medicines. The lack of preventive measures or inadequate medication may present a threat to the development of aquaculture as a sector. Therefore it is imperative to ensure an appropriate supply of suitable preventive and curative veterinary medicines, appropriate education of all participants of their use and the importance of using appropriate medication in implementing sound farming practices. It is also necessary to ensure continuous education on the responsible use of veterinary medications and on possible effects and damage that may be caused by unprofessional approach to disease medication. The production in mariculture in Croatia is not as large as in other Mediterranean countries, so that the incidence of diseases is proportional to farmed quantities, which provides a certain advantage to the Croatian aquaculture sector from the viewpoint of ecological farming and the possibility of certification.

Import of fry and juveniles causes a risk for introducing devastating diseases. In order to conserve the favourable health situation and prevent potential damage caused by the occurrence of diseases, it is necessary to further strengthen the mutual trust, cooperation and the connections of the farmers (the sector) with the veterinary service.

Programmes of control are in the RC implemented for specific diseases of shellfish which on the basis of the current legislation are subject to reporting. However, it is also necessary to perform epidemiological zoning, that is, determine the clearly delineated geographical areas with homogenous hydrological systems, which are a part of the common biological safety systems and where populations of aquatic animals are located with a special health status with regard to the diseases subject to reporting.

The fish farmed in Croatian mariculture are not susceptible to diseases which are subject to reporting. It is thus necessary to identify the diseases considered to cause certain damage to this

branch of farming and make an additional effort to implement monitoring and the programs of control and prevention of such diseases.

Republic of Croatia implements the Plan for Monitoring Sea and Shellfish Quality in Production Areas and Areas of Reintroduction of Live Shellfish, which is in accordance with the provisions of Annex II Chapter II Part A, item 1, and Part B, item 1 and 2 of the European Parliament and European Council Regulation (EC) No. 854/2004 of 29 April 2004 determining specific rules for the organisation of official controls on products of animal origin intended for human consumption (SL L 139, 30 Apr 2004, with all its amendments).

This plan defines the production areas for shellfish farming, the production areas for catching of shellfish and the preliminary production areas. The plan also defines geographical coordinates of permanent sampling points for the purposes of testing for heavy metals, benzo(a)pyrene and the sum of benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene and chrysene and monitoring the microbiological quality of shellfish, and permanent sampling points for monitoring biotoxin and the phytoplankton structure of saltwater. The referential species of shellfish for the purposes of monitoring microbiological quantity, biotoxin, heavy metals, benzo(a)pyrene and the sum of benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene and chrysene in farming areas / zones encompassed by the Plan, are specified individually for each area / zone. The implementation of the Plan ensures a high level of control and guarantees the quality standards of the area for the farming or catching shellfish. The continuity in Plan implementation is the basic prerequisite for further development of shellfish farming.

It is important to note that, in accordance with the Plan for Monitoring Sea and Shellfish Quality in Production Areas and Areas of Reintroduction of Live Shellfish, if specific contaminants are discovered in the tested samples, this shall result in the closure of the production area, or a ban on catching the animals, which may cause severe economic consequences for the farmers.

In terms of markets of mariculture products, apart from tuna which is exported to Japan, most of the production is place on either domestic or EU market (Italy). This constitutes an asset, as Croatian products can reach their final consumer quickly and when offered for sale may have the highest qualitative and nutritive characteristics. The distance to the market may also hold a positive element as to the decrease of costs, thus resulting in the lower prices for the final consumer.

b) Freshwater Aquaculture

The early beginnings of freshwater aquaculture in the Republic of Croatia are associated with the end of the 19th century, when the first trout and carp farms have been established, giving to this segment of Croatian aquaculture a centuries-old tradition. Favourable environmental conditions in relation to the availability of space and quality of water resources, together with the application of professional knowledge and improvement of technological processes are an important factor in the development of freshwater aquaculture. In addition to food production of high nutritional value, this economic activity has important socio - economic component contributing to employment. As freshwater fish farms are located mostly in rural areas, employment opportunities for local residents directly contribute to increased employment rate and development of these areas.

The farming of freshwater fish species in RC is performed as farming of warm water species (cyprinid species) and the farming of cold water species (salmonid species). The most important species in freshwater farming are carp (*Cyprinus carpio*) and rainbow trout (*Oncorhynchus mykiss*). In 2013 there were a total of 48 registered freshwater fish farmers, performing the registered activity of freshwater farming at a total of 54 locations, 27 of which are carp farms and 27 of which are trout farms. In 2013, the total area of carp farms was 10.521 ha, while the total area of trout farms was 3.8407 ha.

Of this 16 carp ponds (9,793ha) are partially used while the six ponds (2,704ha) are neglected. State Agricultural Land Agency has a plan until the end of 2015 to call tenders for the

above six derelict ponds and give them the long-term lease of 50 years. Consequently there are interested companies for taking over these ponds. Using funds from EMFF, that is production investments on active ponds it is expected to increase production from an average of 600 kg/ha to average 800 kg/ha which is about 7,800 tonnes of which is expected 50% of consumer fish. It is evident that after carrying out investments, the total production of consumer freshwater cyprinides will be about 5000 t

Warm water species are traditionally farmed in farms which have an area of several hundred hectares. Most of the warm water farms in Croatia are situated near larger river basins in the lowland, continental part of RC. The farming of cyprinid species mostly encompasses the controlled farming of carp (*Cyprinus carpio*) in monoculture or polyculture with other species, the prevalent ones being grass carp (*Ctenopharyngodon idella*), bighead carp (*Hypophthalmichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*), wels catfish (*Silurus glanis*), zander (*Stizostedion lucioperca*), northern pike (*Esox lucius*), and tench (*Tinca tinca*). For the most part, the production is performed by feeding the fish with both the natural food, which is produced by biological processes in the farms aided by agricultural and technical measures (fertilisation, etc.), and additional food, mostly cereals (corn, wheat, rye, barley). The production cycle in the farming of carps has the duration of three years.

Trout species are mostly farmed in concrete tanks with water flow systems which enable multiple water replacement. Trout farms are usually situated in hill and mountainous regions of Croatia, where there are fast flowing waters with great quantities of high quality cold water, which is a prerequisite for this type of production. The farming of salmonid species almost completely encompasses the farming of rainbow trout (*Oncorhynchus mykiss)*, while the brown trout (*Salmo trutta m. fario*) is only present in a small percentage (< 1%). The process of farming cold water species is whole cycled, with the production cycle having duration of approximately 2 years. The fish are fed with balanced complete industrial food.

The majority of the production of freshwater fish is intended for the national market, although in the last years a part of the products was also placed on the EU market (Italy, Germany, Hungary, etc). A traditionally important market for the Croatian producers of freshwater fish were the countries in the region, e.g. Bosnia and Herzegovina, Macedonia, Serbia and Montenegro; however, the accession of RC to the European Union and the concurrent exit from CEFTA resulted in unfavourable tariff conditions on the markets of those countries.

In 2013 the total production of freshwater fish was 3.235 tonnes, while the carp (2.100 tonnes) accounted for the largest quantities placed on the market. In addition to the production of consumable fish, the production of the one-year and two-year juvenile fish for the purposes of further farming totals approximately 3,000 tonnes per year. In the last decade, the total production of freshwater fish was between 4,000 and 6,300 tonnes. It is important to emphasize that since 2010, due to the accession to the EU, the system of collecting and presenting statistical data on production has changed. The new system of collecting data thus only collects data on produced quantities of the fish which were placed on the market while the previous system (until 2009) included into the data on production the data on one-year and two-year fish (without specifying the quantities of fish placed on the market), which in the current system is considered as unfinished production. In 2011 there was a significant growth in production in relation to 2010, primarily due to the increase in production of carp species, while in 2012 and 2013 there was a notable decline in production, due to the significant decline in production of rainbow trout. This decline in production is partly due to the unfavourable climactic conditions in the previous years (the droughts in 2010 and 2011); however, it should also be viewed in the context of the changes in the statistical methods of collecting data since 2010. The production in freshwater aquaculture for the 2004 – 2013 period is presented in Table 5.

Table 5: Production in freshwater aquaculture 2004-2013 (t)

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trout	1359	1423	1729	1646	2752	2071	2492	2489	1000*	351
Carp	3298	3716	3481	2868	3201	4088	1816	2891	2484	2100
Grass carp	413	492	371	377	206	307	231	158	202	209
Silver carp	10	64	110	207	149	157	73	95	88	127
Big head carp	379	325	480	455	547	599	309	522	296	303
Tench	9	29	30	14	8	4	1	1	3	1
Wels Catfish	71	40	29	38	52	67	29	24	36	35
Zander	8	10	18	17	10	7	7	8	7	11
Pike	10	5	5	8	11	14	8	11	12	6
Other species	61	95	75	165	191	174	82	84	81	92
TOTAL (t)	**5618**	**6199**	**6328**	**5795**	**7127**	**7488**	**5048**	**6283**	**4209**	**3.235**

*Source: MA, *CCE*

During the past several years there is an increase in the number of small family farms (most having an area of less than 1 ha) which usually support some other agricultural primary activity. These farms are usually specialised for farming of only one fish category, mostly up to the production of consumable fish, or for the activity of sports fishery. As part of the tourism and catering industry, the fish caught is sold on the farm itself. In the following period the full implementation of the legal framework for registering small (family) farms is expected, which are for the most part important for enriching the tourism and catering offer of rural areas and contributing to the development of rural tourism.

The warm-water (carp) farms represent areas of great natural value, and have as such been included in the European Union Natura 2000 Network (Regulation on the Ecological Network, OG 124/2013). These large carp farms are found in the continental part of RC, mostly in the area of the great river basins (the Danube valley, lower Drava valley, the Kupa basin, lower Sava valley, the Ilova basin, the Jelas basin, etc.), and are highly significant for the protection of biological diversity. The carp farming in these farms may be connected to the protection of a number of bird species which are permanently or periodically found in these areas. Through the activities which contribute to the nature protection and conservation of biological diversity, and by achieving sustainable production, it shall be possible to increase the value of the final product and diversify the activities in the farms itself (bird watching, photosafari, educational activities, etc.), which is of special importance in the segment of the rural development. Product recognition can also be achieved through branding and fish reared on farms that are located in protected and Natura 2000 areas.

With regard to freshwater aquaculture in Croatia, among the most significant issues is the issue of regulating the activity from the viewpoint of the basic resources use, agricultural land and waters, which is why there is a need for the implementation of an appropriate legal and administrative framework. The special regulation on agricultural land enables the lease of fish ponds, owned by the RC for the period of 50 years, It should be noted that due to long-standing issues of unresolved property rights this legal framework is fully implemented only for the few

existing state ponds, while most of the ponds owned by the Republic of Croatia up to the establishing of the conditions for the assignment of the lease for 50 years, are given for temporary use for a period up to five years. This interim solution is not appropriate on the basis of equivalent insurance requirements regarding disposal of agricultural land owned by the Republic of Croatia for all holders of the pond, which consequently leads to unequal legal position in the market. Therefore, the further harmonization of the legal framework relating to the disposal of state ponds and its synonymous and full implementation of the lease to 50 years are necessary in order to create conditions for long-term investments and further development activities. Further legislation aimed at simplifying administrative procedures shall provide for a more efficient regulation of the issues of the use of freshwaters for the farming of fish and other aquatic organisms. In this segment, the basic issue is the insufficient quantity of water in farms in specific parts of the year, despite the additional quantities being available in rivers. It is necessary to regulate the amount of compensation on the basis of use of agricultural land and water in freshwater farming in an appropriate manner to enable the achievement of competitive prices of the end product, given that those fees represent a significant share of the fixed costs of production. The problem of insufficient diversification of production, lack of branding and product certification, unexplored markets and the lack of organization within the sector, in terms of the lack of organization of producers, does not differ from those already described in mariculture.

An appropriate analysis should be made of the issue of the damages caused by protected wild predators (for the most part fish-eating birds, but also other protected species, such as otters, etc.). Apart from their primary function of production, the carp farms are also home to many protected species, prominent among which are the many species of ichtyophagus birds. Due to the abundance of easily accessible food these species use the farms as locations for resting, nesting or wintering. Due to the unfavourable weather conditions, primarily the drought and the consequent lack of available food in their natural habitats, in the few years there has been an increase in the presence of wild predators in trout farms, causing significant losses in production. Consequently, there is a need for the development of appropriate mechanisms which would enable a sustainable production on the farms while respecting the conditions of nature protection, that is, a need for the development of a protection method against and compensation for the damage caused by wild predators. Furthermore it is necessary to adequately consider all the current issues of climate change and degradation of natural habitats, and to find appropriate solutions compensation for damages caused by natural disasters and climate disasters (floods, etc.).

The issues of prevention and medication of diseases of farmed organisms are the same as those presented for mariculture. On the basis of the current EU legislation, programs for control of viral diseases subject to reporting for carp and trout are implemented. Epidemiological zoning, as described with regard to the farming of shellfish, shall also be implemented for the purposes of freshwater farming.

A common issue is also the lack of processing facilities, the dependence on the imports of juvenile fish, food and equipment, market volatility, as well as the competitiveness of cheaper, lower quality products imported from third countries. Increasingly stringent requirements for the protection of nature and environment, health and food safety will inevitably lead to an increase in the cost of production. There are no specific work criteria defined either, and no aquaculture workers union, which results in poorer level of work safety conditions.

The lack of designed and organised selective breeding activities in aquaculture may be listed as a special issue. Namely, for a number of years selective breeding programmes were implemented and financed by the state, while, at the present time these activities are performed sporadically, as part of private projects and only in certain hatcheries and farms.

c) Sector organisation

In RC today the fisheries sector, and especially the activity of aquaculture, is organised primarily through a chamber system. There is an Agriculture, Food Industry and Forestry Department with the Croatian Chamber of Economy (CCE), which was organised into associations, councils and groups in 1994. One of the associations is the Association of Fisheries and Fish Processing, a part of which is the aquaculture group which acts through the Committee for Freshwater Farming and Committee for Mariculture. The Committee for Freshwater Farming consists of the section in charge of warm water farming (carp) and the section in charge of cold water farming (trout), while the Committee for Mariculture consists of the section in charge of the of "white" fish farming (sea bass, gilt head bream, meagre, common dentex and others), the section in charge of tuna farming and the section in charge of the of shellfish farming (mussels and oysters). The roles of the Department are, among others, coordinating the work of all members and representing their interests in the negotiations of free trade agreements with other countries or trade associations and in the process of the adoption of the economic policy for the agricultural and food industries by the government bodies, participating in the development of legal regulations, encouraging the development of the production by connecting the members to research institutions, providing advice in specific areas, organising trade fairs and exhibitions, preparing projects and studies for international and national institutions. Owing to this type of organisation within the Chamber of economy, it is feasible that the producer organisations could be created and grouped based on existing sections, which due to the production revenue they generate may satisfy the criteria for the recognition while also fulfilling other stipulated requirements (preparation of the production and marketing plan, the possibility of fulfilling the objectives).

A Mariculture Cluster has been formed in 2008, which consists of 3 groups: tuna farmers, "white" fish farmers and shellfish farmers. At the moment, the Cluster has a membership of 80 legal subjects employing a total of more than 800 employees. This farmer organisation produces more than 90% of the total annual production of the entire Croatian mariculture. The future development of the Cluster through the activities of the groups may also be considered through the possibilities that exist for POs. It is important to emphasize that the Cluster members are also members of the Chamber of Economy or the Chamber of Trades and Crafts.

Apart from the CCE, the Croatian Chamber of Trades and Crafts (CCTC) is also active, as an association of crafts founded for the purposes of promoting, harmonizing and representing common interests of crafts. The CCE is organised territorially, meaning it is active in the whole of RC, both at the county level (20 regional chambers) and on the level of municipalities and towns (116 municipality or town associations of tradesmen). The fisheries sector is represented by 7 coastal counties and also is territorially active in order to represent the interests of crafts before government bodies, inform, provide education and improve the promotion through craft fairs. With regard to the activity of aquaculture, the CCE members are mostly shellfish farmers.

The common fishery policy recognizes the importance of organising the sector and strengthening the influence of POs. However, no POs are registered in Croatia as of yet..

Marine Fisheries Act (OG 81/2013, 14/2014 and 152/2014) stipulates the competences for the recognition of producer organisations, the reporting to the European Commission, the implementation of production plans and marketing plans of producer organisations and the method of supervising the activities of these associations. The competent body for recognising the organisations in RC is the Ministry of Agriculture.

By joint action, especially on the EU market, the farmers in RC may guarantee an ample supply of competitively-priced aquaculture products which shall ensure further development for each individual producer. At the moment, most of the producers in aquaculture, which are mostly small-size and medium-size companies, are faced with the inability to meet the consumer demand (buyers/processors), so the establishment of organisations is seen as a logical solution. In this

manner, the supply may be consolidated, which should have an effect on the price so that the producers shall consequently be able to respond to the market demands. The producers themselves currently procure the required consumable material (equipment, food, juvenile fish), which has an effect on the price and product quality, so that, consequently, it is expected that the consolidation of supply and the adoption of common rules shall enable the producers to negotiate better conditions both with regard to the procurement of the necessary raw materials and equipment, and with regard to the prices of their products.

d) Market

By 2010 the share of aquaculture in the total fishery production exceeded 21%, which is higher than the EU average of 20.4%. In the past two years the share has decreased to 19%, mostly due to the decline in tuna and trout production, but also due to an increase in the catch.

In the past five-year period (2008-2012) the growth in the quantity of exports of aquaculture products is evident, which reached a maximum of 7,440 tonnes in 2011, mostly due to tuna export. In 2012 there was a decline in exports, mostly because of the decline in tuna farming, which increases again in 2013. The share of aquaculture in the total quantity of fishery product exports has increased continuously and in the last two years amounted to 22%. The value of the aquaculture product exports has continuously increased and reached almost HRK 500 million in 2011, while in 2012 and 2013 there was a decline due to the decline in tuna export. In the past two years, the share of the aquaculture product value in the total value of fishery product export amounted to 58%.

Given that Italy represents almost one third of consumption of sea bass and sea bream in the world, in this regard Croatia has an exceptional competitive advantage because of its proximity. With a focus on product expiration date of fresh fish of ten days, it is extremely important that the time from harvesting to delivery to final customers is as short as possible. The result of the above are just breeders in Croatia, which are in advantage. The same principle applies to the Central European market. Great additional option in Croatia represents a stable and predictable growth in tourist consumption and use of opportunities from EMFF and further work on marketing and branding. Quality of breeding in the Adriatic Sea in relation to its main competitors, reflects in a stronger structure of fish meat with less fat due to the colder Adriatic Sea. Therefore, together with the aforementioned freshness of delivered goods, and with the marketing approach of Croatian producers it is recognized as more image-quality goods and hence the increase of demand for the export of Croatian goods to Italy.

It is clear from the presented trends and analyses (Appendix 1) that, in addition to the general analysis of trends, the categories of mariculture products should also be analysed separately, so that in marine aquaculture the figures for farming and trade of “white” fish, tuna and shellfish are viewed individually, since tuna farming with its quantities and value significantly alters the general picture of production in marine aquaculture. By analysing the trends for each species, the following may be concluded:

*Sea bass***:** In the past 5 years an average of 50% of the total sea bass production was placed on the local market while the rest was placed on the EU market and exported, with a somewhat higher price on the local market. The average price of exported sea bass is EUR 5.16 (the largest exports were to ITA in fresh condition), while the average sea bass price on the national market is somewhat higher EUR at 5.28.

*Gilt head bream***:** According to the data, in the last 5 years there was a growth in gilt head bream exports, with the higher price at the national when compared to the EU market. In 2012, the average price of the exported gilt head bream was EUR 4.89 (the largest exports were to ITA in fresh cooled condition), while the average price of gilt head bream on the local market was EUR 5.15.

It is important to emphasize that before 1 July 2013 the sea bass export (and all other products derived from this species) to the EU market was restricted by duty free quotes, which had a direct impact on the exports.

Tuna: tuna farming is a very important part of Croatian fisheries industry and is one of the promoters of Croatian mariculture growth. Tuna farming is based on the principle of using caught animals, so that almost the total catch of tuna by the Croatian purse seine fleet is placed in farming cages. At the same time, the greatest part of small pelagic fish caught is used as food for the tuna in farming. The annual value of farmed tuna is between USD 60 and 80 million, and the tuna is exported exclusively to the Japanese market. Owing to tuna farming, Croatia has a positive export balance in fishery products. The production reached its maximum in 2006 when 7,669 tonnes were placed on the market, after which there was a continuous decline to 1,907 tonnes in 2012, due to the ever increasing restrictions on tuna catching.

Shellfish: The total production of shellfish was placed exclusively on the national market due to the impossibility of export to the EU market. Namely, RC was on the list of countries which did not comply with article 11 of the Regulation 854/2004, that is, with the stipulated criteria for shellfish import. The Commission Implementing Decision dated 6 November 2012, on the amendment of the Annex to the Decision 2006/766/EC establishing the lists of third countries and territories from which imports of bivalve molluscs, echinoderms, tunicates, marine gastropods and fishery products for human consumption are permitted, stipulates that the import of these products from RC was allowed from the date of the Croatian accession to the EU. The opening of the EU market presents an opportunity for the Croatian producers for the further development of this segment of farming, especially with regard to farming of mussels, for which the implementation of modern farming technologies shall be required.

Freshwater aquaculture: The majority of freshwater fish produced is intended for national market (approximately 85%), although in the last years, a great part of the products were also placed on the EU market (Italy, Germany, Hungary, etc.). Based on the current breeding capacities at the present farming technology in Croatia it is possible the production of salmonid fishes to a maximum of 1000 tonnes per year. While the export of the rainbow trout is negligible, there has been a growth in carp export. Traditionally important markets for Croatian producers of freshwater fish were the countries in the region, such as Bosnia and Herzegovina, Macedonia, Serbia and Montenegro; however, the accession of RC to the European Union and the concurrent exit from CEFTA resulted in unfavourable tariff conditions on the markets in these countries. In 2012, 85% of the total production was placed on the national market, which amounted to 88% of the total production value. In total 655 tonnes were exported, of which trout accounted for less than 6 tonnes. The average price achieved for carp in the national market was EUR 1.89, while the average price of the exported carp was EUR 1.76. With EUR 2.66, the trout achieved a higher price when exported, while the average price on the national market was EUR 2.29.

e) Perception of Aquaculture

Aquaculture represents a growing, high-value industry whose further development is dependent on the availability and the sustainable use of natural resources in continental and coastal environment. The public perception of how these resources are utilised may thus have a significant effect on aquaculture development, and may either provide an impetus for its further development or, on the other hand, an insurmountable obstacle. Due to the significance of public perception for further aquaculture development, a lot of research was performed on this subject around the world. The results of the performed surveys, as well as the studies and scientific papers mostly show that the public perception of aquaculture depends on how informed the public is, and that the best manner for improving the public perception of aquaculture is to ensure active presence of the industry itself in synergy with the state, regional and local administration which supports and monitors aquaculture development. In this sense, the task of the administrative bodies is to provide a quality legislative framework which shall enable sustainable development of aquaculture and

create the prerequisites for its continuous monitoring and control, while the task of the industry is to provide the public with insight in the production practices, and to demonstrate that during the production process appropriate care is taken of all aspects of environmental protection, the welfare of organisms in farming, and the production of a safe and quality product is ensured.

For the purposes of improving the public perception, the implementation of the principle of systematic and careful approach to spatial planning is a key factor. In addition to preventing potential conflicts between the area users, using spatial planning may also prevent the activity of aquaculture becoming unsustainable in a certain area. Consistent implementation of spatial planning enables coordination and an integrated approach to the management of the environment and nature, assuming responsibilities, and the transparency through including relevant stakeholders and a better understanding of the effects and interactions between resource users as well as users and the environment. Spatial planning also provides an efficient mechanism for achieving aquaculture sustainability and it introduces transparency into policies and the decision-making process and enables a better understanding of the needs for improving the legal framework.

Sustainability, which is the final objective in the development of an economic activity, especially if such an activity is performed by natural resource user, as is the case in aquaculture, is a subject of a growing public interest. Considering this, placing the sustainability as the principle and main objective in aquaculture development is an important element for creating the public perception of aquaculture as a responsible industry which takes care of the aspects of environmental and nature protection. In this sense, the elements of sustainability important for public perception are, for instance, rational energy use with the implementation of alternative energy sources, reduction of the emission of nutrients into the environment and rational use of space and food. Apart from the stated, the sustainability elements important for the public are the implementation of appropriate measures for prevention of escapees, consistent implementation of environmental impact studies and acceptability evaluation of the interventions for the ecological network, care for the protection of biological diversity, etc.

Aquaculture has significant effect on the social and economic situation at the local level. It represents an economic activity that provides employment for local population during the whole year, and may reduce the trend of depopulation of rural area and sensitive island communities while also helping to conserve cultural heritage. This aspect of aquaculture was recognized in public but it is underemphasized. A lot of research demonstrated that the public is aware of this aspect, but that its importance for local communities rarely prevails over those elements which the public traditionally considers as the negative sides of this activity. However, the current unfavourable economic situation at all levels may represent an opportunity for improving the public perception of aquaculture as an activity which ensures the economic prosperity of local communities and which provides employment for local population. It is important to emphasize that in addition to direct employment, aquaculture also influences the development of a number of accompanying activities, and, in case of tuna farming, provides continuous employment of the fishery fleet whose primary activity is catching small pelagic fish.

The potential for the placement of activities in the area leans on indented coast and size, and the possibility of setting up farms on suitable areas nearest to Central European markets. Therefore all the efforts aimed at creating the prerequisites for further aquaculture development with the application of appropriate implementation practices, which include consistent spatial planning with a strategic evaluation of the impact of the plans, achieving sustainability as the final objective of the development, ensuring the safety and quality of the product while at the same time adhering to the criteria related to the animal welfare, and creating the prerequisites for the economic development of the local community, shall have no effect on the public perception unless they are followed by an adequate system of informing the public. Disseminating information in public is a key element in improving the public perception of aquaculture. An important tool in this process is the development of the product labelling and certifying system and the preparation of informative

material on the products, but also on the aquaculture activity itself. At the national level, the legal framework regulating the issues of labelling and informing the consumers on food products includes the Food Act (OG 81/13), the Act on Informing Consumers on Food (OG 56/13), and the by-laws such as the Ordinance on Labelling, Marketing and Presenting Food (OG 63/11, 79/11 and 90/13), the Ordinance on Specifying Nutritional Values of Food (OG 29/09) and the Ordinance on Labels or Signs Determining Food Batch or Lot Number (OG 26/13). While all the business subjects which deal with food are obliged to respect the provisions of the abovementioned legal acts with the objective of providing clear information to consumers on the quality and safety of food products which are found on the market, the certification system is on a voluntary basis. Although there are minimum quality standards defined in terms of food quality for placing the fish on the market, another possibility for the producers is to set and define additional specific quality requirements. This segment is also envisaged as a possible part of labelling or certification schemes. Certifying the product represents a number of possibilities that may add value to the basic product and differentiate it from other similar products found on the market by recognising the specific characteristics of the production process or the product itself. However, since the certification of products presents a number of possibilities and procedures, the legal framework regulating this activity is not homogeneous and leaves ample room for producer freedom and inventiveness both with regard to the implementation of the existing mechanisms and when designing new ideas.

According to the data, and due to the method of farming, and especially the method of fish feeding during the farming cycle, the nutritional value of the farmed fish is partly different than that of the fish in the wild, with the negative elements in this respect being the higher share of total fat in the farmed fish and the possible traces of antibiotics in the meat of the farmed fish. On the other hand, with regard to the consumption of wild fish, there is increasing consumer scepticism due to the ever-worsening state of wild stocks, the periodical presence of heavy metals and other harmful substances in the water due to contamination, and the inconsistency in the nutritional value due to seasonal differences in diet, the change of locations and the differences in the gender and age of the wild fish. The consumers also harbour doubts about the freshness of wild fish, due to the seasonal catch and the storage methods. However, although the small difference in nutritional value between farmed fish and wild fish may really exist, it may be considered negligible, especially if one considers all the comparative advantages of the farmed products, such as the guaranteed consistent nutritional value of the product, the strict control of the production process, a stable and lower price of the final product, the guaranteed freshness of the product and the possibility of traceability. It is important to emphasize that in RC the aquaculture products are tested for compliance with health safety in the sense of bacteriological testing, and are also tested for the presence of harmful substance residue. Apart from this, the environmental parameters at fish farms are also strictly monitored, which guarantees a stable environment in which contamination is not tolerated, while at the same time the prevention of fish diseases has a positive influence on their welfare.

So far, in the Republic of Croatia there have been several surveys for the purposes of gaining insight in the attitudes of consumers with regard to farmed fish as opposed to the wild fish. Among other, the objective of these surveys was also to determine the level of informedness of public on the fish farming in Croatia, the most important reasons for existing nutritional habits with regard to consumption of fish, as well as the basic reasons for preferring different fish species as food products. The results of the performed surveys showed that as many as 8 out of 10 Croats selects wild fish as opposed to farmed fish, and that only one in five Croats does not take as fact the prejudices on the quality of farmed fish as opposed to wild fish. With regard to reasons for choosing wild fish over farmed fish, the consumers often stated that they thought that farmed fish was fattier, softer and had a weaker taste, while, according to them, the prerequisite for introducing farmed fish into their diet were lower price, lower fat percentage, increased diversity, labelling, the level of processing and the improvement of accessibility.

It is also important to emphasize that the total consumption of fishery products in RC is approximately 8-9 kg per capita[20], far below the European average of 23 kg per capita. Based on certain studies[21], the consumption of farmed marine fish in RC does not exceed 0.5 kg per capita.

Based on the results of such studies, it is clear that the national market requires targeted informative and marketing activities in order to increase the consumption of farmed products. In this sense, and in order to improve the consumer perception on the farmed products, it shall be necessary to inform the consumers of the advantages and the characteristics of farming, create a national system for collecting data on consumer attitudes, consumption and market trends, and develop a system for performing economic analyses both within and outside the sector. Furthermore, it is necessary to promote in cooperation with producers the importance of the creation of producers organisations, determine the minimum quality standards, develop marketing channels within the sector, as well as a marketing strategy, while at the same time taking into account the regional and cultural particularities. However, due to the high level of consumer preference towards domestic products, it is preferable to create an appropriate labels ensuring that the products in question are locally produced, while at the same time adhering to the provisions for product labels and declarations at EU level. In order to improve the perception of farmed products and disproving the perceptions currently prevalent among the consumers, the cooperation between the sector and the various state and regional institutions shall be further developed. In this sense, it is also of high importance to strengthen the role of the Advisory Service as a connection between the sector and the administrative bodies, primarily by increasing the capacities.

f) Science and Education in Aquaculture

According to the National Standard Classification of Education (NSCE), the activity of aquaculture in a more narrow sense belongs to the sixth education group including agriculture, forestry and fisheries. According to the scientific categorisation, aquaculture belongs to the biotechnical group of sciences, agriculture field, fisheries branch. In a more general sense, the education also includes groups referring to veterinary medicine and natural sciences, and according to the categorisation of science, aquaculture is also included in the field of food technology, and the area of natural sciences, field of biology. Education in aquaculture issues in RC is performed by academic institutions, while there is also an informational and educational system implemented by the Ministry of Agriculture Directorate of Fisheries and the Advisory Service.

Table 6: Institutions participating in academic education in aquaculture

Name of institution	Institute Department Laboratory	Undergraduate studies	Graduate studies	Doctoral studies
University of Dubrovnik	Department of Aquaculture	Aquaculture studies	Mariculture studies	Postgraduate University Studies in Applied Marine Science
University of Dubrovnik Maribic d.o.o. Mariculture Business Innovation Center		Practical training for Aquaculture studies – University of Dubrovnik	Practical training for Mariculture studies – University of Dubrovnik	

[20] Croatian Bureau of Statistics

[21] Monfort, M.C., 2007. Marketing Of Aquacultured Sea bass And Sea bream From The Mediterranean Basin, FAO Studies and Reviews, No. 82

Institute of Oceanography and Fisheries		Marine Biology and Ecology	Marine Biology and Ecology	Postgraduate University Studies in Applied Marine Science
University of Zagreb Faculty of Food Technology and Biotechnology			Food Engineering Courses: Chemistry and Meat and Fish Technology	
University of Split	University Center of Marine Studies	Marine Biology and Ecology Sea Fishery	Marine Biology and Ecology Sea Fishery	Postgraduate University Studies in Applied Marine Science
University of Zagreb Faculty of Agronomy	Department of Fisheries, Beekeeping, Game Management and Special Zoology	Animal sciences Modules: Fisheries Biodiversity of the Adriatic and the Freshwaters Sports and Recreational Fishing	Fishery and Game Management Modules: Aquaculture; Biodiversity of the Adriatic and the Freshwaters; Farming of Invertebrates; Limnology and Oceanology; Ichtiology; Fisheries Food and Feeding in Aquaculture	Postgraduate Specialist Studies in Fisheries, Postgraduate Doctoral Studies in Agriculture
University of Zadar	Department of Ecology, Agronomy and Aquaculture	Course: Fishery and aquaculture		
University of Osijek Faculty of Agriculture	Department of Game Management, Beekeeping and Fisheries	Modules: Fishery and Game Management; Aquaculture;		
Juraj Dobrila University of Pula		Marine studies		
University of Zagreb Faculty of Science	Department of Biology		Ecology and nature Protection- courses: Aquaculture; Mariculture and its Impact on Environment; Aquaculture and Fishery; Management and Protection of Sea	Postgraduate University Studies in Oceanology
Ruđer Bošković Institute	Institute for Marine and Environmental Research, Laboratory for Aquaculture and Pathology of			Postgraduate University Studies in Oceanology, University of Zagreb Faculty of Science

	Aquatic Organisms			
University of Zagreb Faculty of Veterinary Medicine	Department of Biology and Pathology of Fish and Bees			

The educational institutions that have within their programs courses, modules or studies in aquaculture are found in all areas of RC. This enables a coordinated approach to preparing the strategy for the system of education in aquaculture, which nowadays is still fragmented and mostly includes only the basic knowledge and skills. In RC there are insufficient specialised and interactive programmes that would integrate basic technological and biological knowledge into business ventures ranging from management of technological processes to designing and creating business plans.

The practical application of knowledge and skills in aquaculture is performed by experts educated in the RC. On the other hand, research and development as well as scientific institutions in RC have a long-standing cooperation with institutions in other countries (both in the EU and non-EU countries), which in the past guaranteed a successful transfer of knowledge, technologies and technological solutions. Due to the long-standing experience in the production itself, the cooperation of business subjects with producers in other countries has also helped in the process of the transfer of knowledge and technologies.

Specific education and informing in aquaculture has also been implemented by the competent institutions of the state. These are in the first instance the Ministry of Agriculture and its Advisory Service, and, periodically, other institutions, such as the Paying Agency for Agriculture, Fisheries and Rural Development and the Croatian Chamber of Economy which for almost 10 years has provided international economic and scientific consultation on aquaculture and has financed the publishing of the scientific and expert magazine Croatian Journal of Fisheries. The education and informing is provided through lectures, workshops and consultations and by publications, brochures, media and the Internet. But still there is no lifelong learning framework defined.

The scientific research in aquaculture is performed by institutions registered for performing the scientific activity, as well as the companies which perform the activity of farming.

Table 7: List of institutions and number of registered scientific research projects in aquaculture 2003 - 2013

Name of institution	Institute/Department/Laboratories	Projects-No.
University of Dubrovnik	Department of Aquaculture Institute for Marine and Coastal Research Maribic d.o.o.	4 4 6
University of Zagreb Faculty of Food Technology and Biotechnology		5
Croatian Institute of Veterinary Medicine	Department of Pathological Morphology/Laboratories for Fish Pathology	7

Institute of Oceanography and Fisheries in Split	Laboratories for Aquaculture	14
University of Zagreb Faculty of Agronomy	Department of Fisheries, Beekeeping, Game Management and Special Zoology	25
University of Zagreb Faculty of Agronomy	Division for Marine and Environmental Research, Laboratory for Aquaculture and Fish Pathology	49
University of Osijek Faculty of Agriculture	Department of Game Management, Beekeeping and Fisheries	?
University of Zagreb Faculty of Science	Department of Biology	2

In the past decade, the number of scientific and research projects is relatively high. Over a hundred projects have been realised or are in progress; however, these projects are rarely organised into larger programmes. There is a lack of strategic scientific research programmes on the basis of which specific projects are financed. The realised projects and the projects currently in progress significantly contribute to maintaining the scientific corpus which represents an important development potential and which shall be better utilised for the purposes of reaching long-term development objectives in aquaculture.

A part of the projects is aimed at improving the quality indicators of development, such as food safety, health of organisms in farming and environmental issues. These projects also assist the stabilisation of the production environment, and understanding and preventing potential production issues. The projects aimed at increasing technological efficiency, diversifying the production and creating new products in the sector have not until now systematically contributed to an increase in production, nor to an increase in the number of new aquaculture products.

With regard to the application of science for the purposes of nature and environmental protection in the areas in which the activity of aquaculture is performed, high ecological standards have been achieved in RC. RC has at its disposal an ample number of experts and scientists in many disciplines who are able to evaluate the suitability of the proposed farming technologies for the nature and the environment, on the basis of which numerous background studies have been prepared for the purposes of implementing the procedure for the environmental impact assessment, as well as to evaluate the need for performing the environmental impact assessment, which were the prerequisites for the granting of location permits.

One of the elements of NSPA implementation also requires a better connection of the research and development institutions to the production itself, in order to achieve a more successful and competitive production. Therefore, one of the planned NSPA measures envisages financing of scientific and research projects in the fields of cost effectiveness of the farming of specific species and the development of individual technological solutions. Furthermore, the possibility of connecting the stakeholders is also planned (development, scientific and research institutions and the production sector) through a workshop and education system. A more extensive involvement of the Advisory Service is also envisaged as well as enabling of the adequate advisory services that shall also be connected to the scientific community.

g) SWOT analyses

Table 8: SWOT analysis of mariculture

STRENGTHS	WEAKNESSES
• Favourable environmental conditions • Tradition in mariculture farming. The farming of shellfish started several centuries ago, with a great upswing in production during the 20th century. Fish farming has a tradition of almost 40 year, among the earliest in Europe, and tuna has been farmed since the 1990s. • Production of food of high nutritive values in relation to competition due to the particularity of the Adriatic Sea • Sustainable mariculture through conserved biodiversity and ecosystem services also ensuring a possible higher product market value • Favourable economic and environmental factors– "low carbon footprint"and specific spatial planning criteria for mariculture zones are in place. • Ability to provide a permanent supply to the market through constant product quantity and quality • Proximity and trading relations with main markets (EU and external): the share of aquaculture products in total exports has grown continuously. The majority of the farmed fish except tuna is placed on the EU market (especially Italy). There has been a constant growth in the production, due to the increase in domestic consumption and the stabilisation of the prices in the EU market. Tuna production is almost exclusively for the well-established Japanesse market.	• Insufficient capacities of the existing fish hatcheries: domestic production in land-based hatcheries covers less than 50% of the needs of the installed farming capacities • Non-existence of shellfish hatcheries • Poor diversification of species and products • Poorly developed coastal infrastructure • Non-existence of producer organizations • Non-existence of marketing strategy and lack of product branding and licensing • Insufficient cooperation between science and the sector and lack of applied scientific and research projects • Insufficiently developed work conditions in terms of health and safety • Limitations for the performance of farmed fish medical treatment and lack of medicine registered in the Republic of Croatia • Lack of lifelong learning framework • Lack of processing capacities and production of products with a higher added value • Undefined epidemiological zones • Inadequate disposal of waste generated in the production process • Possibility of escape of alien species from the farm into nature which can lead to their intersections with specimens from the wild and modified genetic features
OPPORTUNITIES	**THREATS**
• Availability of ESI funds • Availability of further development for the implementation of Integrated Coastal Zone Management • Contribution to the development of island communities (employment, related activities) • Diversification of production by introducing new species in commercial farming • Development of new products and technologies and connection with food processing sector • Establishment of land-based recirculating aquaculture systems (RAS) on the land • Development of organic and ecological fish farming	• Frequency of natural disasters and adverse weather events • Market instability • Production price increase due to ever stricter requests of nature and environmental protection, hygiene and safety • Losses caused by diseases • Impossibility of renewing a concession for using a maritime domain • Potentially increased costs and limitations in farming due to Natura 2000 areas • Damage caused by fish-eating birds, mammals and other animals • Introduction of new diseases through import

• Possibility of branding products originating from protected areas and Nature 2000 area • Introduction of new quality management practices and development of the existing • Promotion of high nutritive value of farmed fish and shellfish • Production of industrial fish food • Better use of installed farming capacities • Framework of EUSAIR. Support through Pillar I, Topic II of EUSAIR for the scientific cooperation on fisheries and fish stock as well as sustainable management of fisheries and development of common standards and practices.	

Table 9: SWOT analysis of freshwater aquaculture

STRENGTHS	**WEAKNESSES**
• Favourable environmental conditions and water quality • Tradition in farming • Production of food with a high nutritive value • Contribution to employment • Inclusion in Natura 2000 sites. Carp farms are an integral part of the ecologic network Natura 2000 and internationally important areas for birds, and as such represent important habitats for wild species and contribute to the conservation of biodiversity • Ability to provide a permanent market supply through comstant product quantity and quality • Coherence with environmental conditions and other activities (sport, tourism, etc.)	• Obsolete farming and processing technology • Poor diversification of species and products • Insufficient quantity of available water in certain periods of production cycle • High water fees • Unregistered small (family) farms • Inexistence of producer organizations • Lack of selective breeding • Insufficient cooperation with science and lack of applied scientific and research projects • Low consumption and insufficient consumer information • Lack of processing capacities • Dependency on fish food import • Lack of product branding and licencing • Insufficient health control and consequential losses caused by diseases which are not on the list • Lack of medicine for fish treatment registered in the Republic of Croatia • Undefined epidemiologic zones and lack of information systems which would enable their establishment • Possibility of escape of alien species from the farm into nature which can lead to their intersections with specimens from the wild and modified genetic features
OPPORTUNITIES	**THREATS**
• Availability of ESI funds • Availability of space and capacity for farming • Diversification of production through production diversification (trout, grayling,	• Transmission of diseases • Market instability • Price increase due to ever stricter obligations nature and environmental protection, food hygiene and safety

huchen, etc.), farming new species and development of new products and technologies, and the connection to the processing sector • Possibility of producing a wide range of products of a higher added value • Development of ecological and organic farming • Establishment of recirculating aquaculture systems (RAS) • Introduction of new quality management practices and development of the existing • Promotion of the high nutritive value of farmed fish • Further contribution of carp farms to nature protection and maintenance of biodiversity • Contribution to the development of rural areas through the diversification of activities at farms (rural tourism, fishing, etc.) and through establishment of a framework for small (family) farms • Possibility of using naturally valuable warm water (cyprinid) farms for touristic and recreational purposes based on nature protection (new aspects of contents for visitors) • Possibility of branding fish farmed in warm water (cyprinid) farms in protected areas and Natura 2000 areas • Possibility of realizing higher production per unit of farming surface on existing farms	• Lack of a lifelong learning framework • Degradation of nature and environment due to the human and climate influence • Adverse climatic events causing flood and drought in aquaculture areas • Damage caused by fish-eating birds and other animals

Table 10: SWOT analysis of science and education

STRENGTHS	WEAKNESSES
• Long tradition in aquaculture • Accepted knowledge and skills in aquaculture • Sufficient number of educational and scientific institutions • Good connection of scientific and educational institutions with international institutions • High quality of fundamental knowledge acquired in education • Natural diversity of Croatia provides an opportunity for the production of new farming technologies • Skills and practical knowledge in companies at a European level • Established cooperation of individual entrepreneurs with scientific institutions in RC, but also in the EU • Experience in financing development	• Lack or unavailability of specialised studies • Lack of lifelong learning • Insufficient number of joint development projects of economy and science • Lack of networking between development and science projects in several priority strategic units • Insufficient application of criteria of possible project impacts on economic growth, energy efficiency and ecological sustainability of aquaculture in the project evaluation process itself • Poor horizontal cooperation of scientific and educational institutions within RC • Poor horizontal cooperation of the competent ministry on informing and educating regional and local administration on changes in the criteria of social and economic as well as ecological efficiency of aquaculture • Poor horizontal cooperation in financing

projects though MA	integrated projects in aquaculture
OPPORTUNITIES	**THREATS**
• Possibility of financing development and innovation projects through instruments of new Common fisheries policy • Technical assistance in educating and informing institutions competent for the establishment of the CFP in RC • Possibility of establishing continuous and organized information and education of entrepreneurs and regional and local self-administration through better organisation of the competent institutions for the establishment of CRP • Establishment of a network of educational institutions within RC as well as with institutions within the EU in order to establish robust and comprehensive educational programmes • Establishment of cooperation of scientific institutions on comprehensive development projects	• Closing of certain educational programmes due to the impossibility of their financing • Financial crisis may result in budgetary restraint towards minimum system maintenance. • Loss of human potential (knowledge and skills) due to the stagnation in the sector • Providing long-term advantage to instant solutions over development programmes undoubtedly leading towards bad copying (plagiarizing) and may cause harm to the existing scientific and educational infrastructure

Aquaculture in RC still requires a more streamlined legal framework, particularly in relation to freshwater aquaculture. Since aquaculture is regulated by a series of special regulations, in order to successfully administer the activity, horizontal compliance of the legal framework and inter-institutional cooperation between all the bodies included in the process of the activity approval is necessary, in order to shorten the procedures and create favourable conditions for activity development. For this purpose it is necessary to adopt a by-law which would stipulate criteria for freshwater aquaculture spatial planning, as it is defined for marine farming. It is necessary to apply farming technologies that shall secure the sustainability of aquaculture providing environmental services within Natura 2000 areas, as well as technologies that result in lower water usage and/or in lesser organic load into the water-flow, as well as technologies that shall prevent escapees. In terms of farming technologies which contribute to the protection of nature and environment further opportunities for the development of freshwater aquaculture are also possible through the establishment of a recirculating system aquaculture (RAS) and the development of ecological and organic farming. The main reasons for the development of such systems are: energy conservation, reduced water consumption, reduced land use, the ability to create different optimal characteristics in the breeding area thus shortening the breeding cycle, with an emphasis on the possibility of using non-specific sites.

Establishment of recirculating aquaculture system (RAS) represents a sustainable way of farming with a positive impact on the environment. There is no possibility of escape of fish and impact on the natural stock which prevents the possibility of genetic pollution and dilution of genes in natural stock. A closed system separated from the naturally occurring organisms and without the

possibility of the spread of pathogens in both directions and without interaction from external predators.

The use of natural resources for the purpose of the RAS represents an efficient use of land and water management. For example, inside the RAS can be set up unit for collecting and concentrating the waste material deposited and used as fertilizer in agriculture or can be established IMTA - Integrated Multi-Trophic Aquaculture. Production entities in the Republic of Croatia recognized this new way of farming and there are conceptual frameworks for the launch and establishment of production. So far it is received entrepreneurial initiative of building land recycling system for breeding flatfish, and thus other valuable fish and crab species, breeding native organisms in a completely closed system and also hatcheries of oysters and other valuable species of shellfish.

In Croatia, the production mainly takes place in cages and mostly sea bass and sea bream are grown. Market demands for new breeds and there is increased demand for marine organisms in general, opening up the possibility of establishing new technologies that would achieve the set goals. As yet there is no developed recirculating aquaculture system in Croatia, there is an intention to protect the environment and improve the farming conditions and therefore establishment of innovative technologies in our area, whose innovations in technology and products farmed qualified for the European and world markets. The government should recognize the potential and enable and approve funding for researchers of RAS technology so that they could develop and contribute to the innovation by breeding new species in an environmentally friendly way. By connecting science and industry new sustainability technologies are developed including waste management on farms and its utilization in the form of fertilizers while some farms make pellets from particular ingredients as food for other marine organisms.

According to the method of cultivation RAS provides the highest standards of organic production due to the strict control system with negligible impact on the environment. Various experimental cultivation of marine organisms in cages in contrary to the cultivation on land facilities achieved better performance of fish, among other things, lower food conversion, faster growth and shortening of production period. It allows greater control of cultivation parameters and thus allowing farming all year round. Thus the RAS allows the increase of the production capacity. In order to achieve economic viability of production RAS farms have higher breeding densities of fish per volume unit. The density of fish in the ponds is primarily dependent on the quality of water and the type of farmed fish. Overcrowding is particularly avoided in hatcheries where the cycle is very rapid and conditions must be optimal. As the fish grows there is an increase in the density of fish in kg per volume unit to the extent that enables optimal productivity and the best conditions for the health and welfare of the fish.

The farming technology is developed in the world for thirty years now and the focus is placed on the ability to increase production, profitability and sustainability. Technical innovations are necessary in order to continue the growth and development in the field of aquaculture in Croatia, and thereby increase the competitiveness on the European and world markets.

With regard to marine farming, it is necessary to include farming installations on the list of spatial interventions which are not considered as building, and which is defined by a by-law, aiming at fully preventing the possibility of misinterpretation by local government competent for granting of location and building permits. When determining marine farming area it is necessary also to predict areas on the coast for placing the necessary infrastructure, the purpose of planning and creation of an area that shall have all necessary contents which shall provide full cost effectiveness of the investments. It is also necessary to determine basic criteria for placing the farming of marine organisms on land in closed recirculating systems, and try to establish a mechanism of extending concessions on a maritime domain for the purpose of performing the economic activity of farming fish and other marine organisms. It is absolutely necessary concessioning of the maritime domain for the purpose of this activity to keep on the county level, as well as to consider the possibility that

the award of concessions for strategically important investments in aquaculture is regulated at the state level. Furthermore, it is necessary to determine precise protocols of implementing the regulations governing the farming of alien species for marine and freshwater aquaculture and to apply farming technologies that shall prevent escapees.

It is necessary to define the guidelines for the preparation of the Environmental Impact and ASIEN studies for aquaculture in order to define the scope and type of research required for the preparation of these documents. Based on the current regulations these procedures are carried out equally for all activities, while the definition of specific guidelines for aquaculture would contribute to better results and a shortening of the overall process. In planning and zoning of farm locations it is necessary to take into account the possibilities of cumulative effect, in particular for "white" fish, shellfish and cold-water fish farms.

Both the infrastructure and the market of aquaculture in RC are not sufficiently developed. The consumption of aquaculture products in RC is very low, the perception of aquaculture products is negative, technological development of the sector is not at the appropriate level, all resulting in a product of insufficient competiveness and insufficiently developed domestic market. Furthermore, in marine and freshwater farming, insufficient diversification of products and species in farming is evident, and in order to increase competiveness it is necessary to invest efforts in introducing new species, as well as in adding value to the final product and the introduction of quality management techniques. In this sense direct cooperation with scientific institutions is indispensable, and it is necessary to plan research that shall be designed in accordance with the needs of the sector. It is necessary to collect scientific projects around recognized strategic objectives for which measurable implementation is expected in certain technological solutions and raising production standards. It is also necessary to introduce a lifelong learning system for the participants in aquaculture.

In addition, the problems in the segment of preventing and treating diseases of farmed organisms indicate to the need of establishing an educational platform for the purpose of improvement of communication between producers and experts in diagnosing diseases. The basis for the elimination of possible damages, economic, ecological and social, and public health as well, caused by introducing diseases is in the improvement of cooperation between sectors and experts in particular areas of diagnostics and treating aquatic organisms in farming, which shall result in fully implemented measures of biosecurity and prevention in farming. It is necessary to develop prevention programmes of disease appearance, fast and accurate diagnostics and aimed treatment of organisms in farming. It is also necessary to implement epidemiological zoning, in order not to declare the entire area of RC infected in case a disease occurrence in one farm. Bacterial and parasitic diseases shall also be included in the supervision programmes. Measures against escapees in Natura 2000 areas need to be controlled.

Farmers should form producer organisations and develop own development policy, establish product branding and certification systems, and establish other means of communication with consumers for the purpose of improving the perception and acceptance of these products by the consumers. It is necessary to establish a system of continuous information and education of competent institutions and the public on economic, social and ecological role of aquaculture in society development.

Table 11: Main limitations for sustainable development of aquaculture in RC

• **Insufficiently defined and incompliant legal framework (particularly in freshwater aquaculture)**
• **Lack of clear and uniform criteria for spatial placement of the activity, particularly in freshwater aquaculture**
• **Insufficient cooperation of the sector with scientific and research institutions**

- **Insufficient competitiveness**
- **Insufficiently used domestic market**
- **Negative perception of aquaculture**
- **Lack of lifelong learning**

5. Vision, Strategic Objectives and Priorities

Integration of aquaculture into the environment, and consequently, into society, represents a permanent opportunity and challenge both for marine farming as well as for the freshwater one. Precisely because of this, planning the further development of activities based on the principle of ecosystem approach is of strategic value, on the basis of which aquaculture in RC may become the leading sector in the development of the EU Blue Growth strategy.

a) *Vision*

Aquaculture in RC is economically, socially and ecologically sustainable, with a developed infrastructure, strong human potentials and an organized market. The consumption of aquaculture products is equal or above EU average, while the technological development of the sector is among the best in the EU.

b) *Strategic Objectives and Priorities*

I. *Quantified growth objectives (2014-2020)*

The following growth of production in marine and freshwater aquaculture is planned until 2020:

Species	2013 - tonnes	2020 - tonnes
Marine fish farming (excluding tuna)	**5.858**	**10,000**
Bluefin tuna	**2.616**	**3,000***
Shellfish	**2.000**	**5,000**
Warm water freshwater species	**2.884**	**5,000**
Cold water freshwater species	**345**	**1.050**
TOTAL	**13.703**	**24,050**

*minimum, depending on fishing quotas

II. *General development and growth objectives of marine and freshwater aquaculture (2014 – 2020)*

Objective 1	**Strengthen the social, business and administrative environment for aquaculture development**
Objective 2	**Increase in the total production to 24,050 tonnes while adhering to**

	the principles of economic, social and ecological sustainability
Objective 3	**Improvement of the perception and increase in the national consumption of aquaculture products**

III. *General development and growth priorities of marine and freshwater aquaculture (2014 – 2020)*

General priorities of marine and freshwater aquaculture in the 2014-2020 period may be categorized into the following topics:

1.Legal framework and administration	
Priority 1.1	Simplification of administrative procedures
Priority 1.2	Improvement of the data collection system
2.Spatial placement of the activity and spatial planning	
Priority 2.1	Ensuring sustainable development and growth through coordinated spatial planning throughout the territory of the RC, ensuring of the necessary farming locations, locations for the accompanying infrastructure, ensuring the adequate quantity of water for fresh water aquaculture
3.Environment and nature	
Priority 3.1	Application of environmentally acceptable technologies
Priority 3.2	Protection and compensation of damages from predators
4.Health of organisms in farming	
Priority 4.1	Determining and implementing protocols in order to prevent and control diseases and the welfare of aquatic animals in farming
Priority 4.2.	Epidemiological zoning of river basins and marine areas for the farming of fish and shellfish in order to ensure free movement of aquaculture products
5.Market and competitiveness	
Priority 5.1	Diversification of production and the introduction of new species into farming
Priority 5.2	Improving the cooperation of the industry with the scientific as well as research and development institutions
Priority 5.3	Enabling the farming of other aquatic organisms, except fish and shellfish
Priority 5.4	Insurance of farming production
Priority 5.5	Founding producer associations
6.Perception and communication	
Priority 6.1	Increasing the competitiveness, certification, branding
Priority 6.2	Development of the domestic market, marketing strategies and the promotion of aquaculture products including the improvement of the communication with consumers
7.Education and employment	
Priority 7.1	Continuous general education and informing the participants in aquaculture with special care for the health and welfare of aquatic animals, aquaculture waste management (in terms of waste reduction), with strengthening the role of Advisory Services
Priority 7.2	Working conditions improvement
Priority 7.3	Increasing employment

IV. *Objectives and priorities of development and growth per individual segments of marine and freshwater aquaculture (2014-2020)*

MARINE AQUACULTURE	
OBJECTIVE 1	**Fish hatcheries** *Increase of production to 40,000,000 of juvenile fish while adhering to the principles of economic, social and ecological sustainability*
Priority 1.1	Modernization and reconstruction of the existing hatcheries
Priority 1.2	Building new hatcheries and ongrowing units on land
Priority 1.3	Selection work
OBJECTIVE 2	**Fish farms (except tuna)** *Increase of production to 10,000 tonnes while adhering to the principles of economic, social and ecological sustainability*
Priority 2.1	Modernization and reconstruction of the existing farms
Priority 2.2	Establishment of new farms
Priority 2.3	Development and introduction of new farming technologies
Priority 2.4	Development and introduction of recirculating aquaculture systems (RAS) on land
Priority 2.5	Adding new value through processing
Priority 2.6	Improvement of product quality
Priority 2.7	Decreasing the negative impact of farming activities on the nature and environment
Priority 2.8	Polyculture farming
Priority 2.9	Increase of production at the existing locations along with maintaining or decreasing the intensity of the impact on the environment
OBJECTIVE 3	**Tuna farms** *Production of minimum 3,000 tonnes, depending on fishing quotas, zootechnical and market opportunities*
Priority 3.1	Modernization and reconstruction of the existing farms
Priority 3.2	Modernization and introduction of new farming technologies
OBJECTIVE 4	**Marine rainbow trout farms** *Commercial production while adhering to the principles of economic, social and ecological sustainability*
Priority 4.1	Development and introduction of farming technology
OBJECTIVE 5	**Shellfish hatcheries** *Production of a minimum of 20,000,000 shellfish juvenile while adhering to the principles of economic, social and ecological sustainability*
Priority 5.1	Building shellfish hatcheries
Priority 5.2	Adopting technologies for producing juvenile European flat oyster (*Ostrea edulis*), juvenile scallop (*Pecten jacobaeus*) and other juvenile shellfish
OBJECTIVE 6	**Shellfish farms** *Increase of production to 5,000 tonnes while adhering to the principles of economic, social and ecological sustainability*
Priority 6.1	Establishment of new farms
Priority 6.2	Establishment of wastewater control in shellfish farming areas
Priority 6.3	Improvement of technologies in oyster and mussel farming
Priority 6.4	Adding new value through processing
Priority 6.5	Construction of distribution and purification centres
Priority 6.6	Determining oyster spawning areas and improving the technology of

	collecting juvenile oysters from the environment
Priority 6.7	Establishment of a compensation system in case of temporary harvesting suspension, solely for the purpose of public health protection
FRESHWATER AQUACULTURE	
OBJECTIVE 7	**Hatcheries and nurseries of warm water species** *Increase of juvenile fish production while adhering to the principles of economic, social and ecological sustainability*
Priority 7.1	Building new hatcheries and nurseries
Priority 7.2	Modernization and reconstruction of the existing hatcheries and nurseries
Priority 7.3	Selective breeding
OBJECTIVE 8	**Warm water species farms** *Increase of production to 5,000 tonnes while adhering to the principles of economic, social and ecological sustainability*
Priority 8.1	Modernization and reconstruction of the existing farms
Priority 8.2	Establishment of new farms
Priority 8.3	Improvement and introduction of new farming technologies
Priority 8.4	Ensuring production sustainability within protected areas and ecological network areas
Priority 8.5	Building the accompanying infrastructure
Priority 8.6	Adding new value through processing and diversification of activities (multifunctional farms)
Priority 8.7	Reconstruction of existing poorly tended farms
Priority 8.8.	Selective breeding
OBJECTIVE 9	**Cold water species hatcheries** *Increase of juvenile fish production while adhering to the principles of economic, social and ecological sustainability*
Priority 9.1	Modernization and reconstruction of existing hatcheries
Priority 9.2	Building new hatcheries
OBJECTIVE 10	**Cold water species farms** *Increase of production to 1,050 tonnes while adhering to the principles of economic, social and ecological sustainability*
Priority 10.1	Modernization and reconstruction of the existing farms
Priority 10.2	Establishment of new farms
Priority 10.3	Improvement and introduction of new farming technologies
Priority 10.4	Building the accompanying infrastructure
Priority 10.5	Adding new value through processing and diversification of activities

V. Link to the main objectives and strategic approach to the main objectives of the EU

For the purpose of achieving the key EU objectives, Croatia is planning to continue with the application of clear and simple procedures in the field of mariculture which are necessary for the development of business activities. Croatia has already implemented the basic principles of marine spatial planning and zoning in most counties, which has reduced the administrative burden. Good practice implemented in some counties (*see Chapter 4.d Spatial planning*) shall project to other areas, and this issue shall be addressed horizontally at the national level. The issuance of licences (permits) for mariculture has not been identified as the key problem in the development of this activity and it is not considered to be an element for which significant activities shall be needed. On the other hand, significant deficiencies were found in the same process in freshwater farming, and Croatia is planning to undertake a number of steps in order to regulate this segment in an

appropriate manner. In freshwater farming the key priority is the simplification and facilitation of the legal framework and procedure necessary for obtaining permits. Moreover, better coordination of national bodies also represents one of the key elements. There are plans to address this element through the Management and Monitoring Committee which shall be established for the purpose of monitoring and rating the results of the implementation of this NSPA. In addition, it is envisaged to strengthen the coordination through the Monitoring Committee for the Operational Programme for EMFF that shall serve as a key mechanism for monitoring of financing and achievement of NSPA objectives.

In the realization of general objectives of the Europe 2020 Strategy, the implementation of NSPA, in accordance with the provisions of the Common Strategic Framework, shall contribute to the achievement of thematic objectives (TO) 3, 4, 6, 8 and 11. Although the EMFF, while funding the implementation of the NSPA, is not contributing to the thematic objective 11 of the Common Strategic Framework, it is assessed that the simplification of administrative procedures, an integral part of the EC guidelines, represents an activity that may affect TO 11. In addition, the realization of this TO shall not be funded by EMFF.

The measures that Croatia plans to implement are listed as priorities in this chapter and shown in Table 12, while the funding sources are shown in Chapter 7.

6. Harmonization with Strategic EU Guidelines for sustainable development of aquaculture

a) ***Response to strategic guidelines***

I. *Simplification of the administrative procedure*:

1. *Assessment of the situation at the national level:*

- *Qualitative description of the administrative structure*

The qualitative description of the administrative structure, including an overview of the procedures for obtaining the necessary licenses for mariculture and freshwater farming is shown in Chapter 4.

- *Quantitative data and explanations*

In the 2007-2013 period the Ministry of Agriculture – the Directorate for Fisheries has granted 428 permits for marine fish and shellfish farming. Out of the received 430 applications 428 of them were approved, the success rate being 99.53%. The high success rate is a result of the efforts invested into vertical and horizontal linking and coordination of administrative bodies and procedures preceding the issuance of licences within the Ministry of Agriculture – the Directorate for Fisheries. These activities included participation by the Ministry of Agriculture – the Directorate for Fisheries in the procedure of physical planning, as well as issuing the approval to initiate the procedure for awarding concession for the maritime domain.

In the 2007-2013 period the Ministry of Agriculture–the Directorate for Fisheries issued 46 permits for freshwater aquaculture, with a success rate of approximately 90%. It is expected that the rest of the received requests shall be approved after the procedures related to use of agricultural land and waters are finished in accordance with the special regulations.

The whole procedure before all the administrative bodies lasts from 3 months to 2 years in accordance with the stipulated deadlines and depending on the complexity of the procedure or the need for preparing an assessment on the impact on the environment and the ecological network, while there is also significant problem for the granting of permits for freshwater farming.

The average duration of the permit for marine farming is 15 years, while the allowed maximum duration is 20 years. On the other hand, freshwater farming lasts in average 20 years and a maximum of 50 years.

- *The key elements of activities aimed at reducing the administrative burden*

It is assessed that the average length of the procedure for obtaining the permit for marine farming in Croatia does not represent a significant administrative burden and is within the acceptable time limits. On the other hand, the process of the granting of permits for freshwater farming is currently in the process of establishing mechanisms for the implementation of new regulations, which currently presents a significant obstacle to the development of the sector. The strategic objective is procedure harmonization, that is, the

establishing of a single effective implementation mechanism, which implies maximum cooperation from all competent authorities. For this purpose, establishing a permanent system is planned for informing the public on administrative procedures via web pages. When it comes to the granting of the permit for marine farming the key element is the accessibility/availability of the farming area. As referred to in Chapter 4, Croatia is already implementing the key elements of the ICZM and has already performed the complete procedure for defining aquaculture areas/zones in certain counties. We plan to expand this practice to the whole territory of Croatia. When it comes to land waters and freshwater farming it is necessary to harmonize the implementation of new regulations and establish the criteria for ensuring space for the aforementioned activities.

- *The expected numerical indicators for administrative load reduction*

Since the maximum duration of the whole administrative procedure for obtaining the permit is currently 24 months, it is expected that the implementation of this plan shall reduce that time to a maximum of 18 months.

II. Ensuring sustainable development of aquaculture through coordinated spatial planning:

- *Assessment of the situation at the national level: the existing spatial planning framework (at land and sea), assignment of duties, existing physical plans.*

A detailed description of the existing legal framework for spatial planning, the administrative structure and the existing plans is provided in Chapter 4.

- *The key elements of the activities: how to promote spatial planning while bearing in mind aquaculture interests*

Croatia shall continue to implement good marine farming practice which has proved itself so far with the aim of implementing equal practice in all local units of government. RC shall establish criteria for ensuring space for these activities with the aim of achieving equal results in the field of freshwater farming planning.

- *The quantity indicators (the number and area of new aquaculture zones, number of spatial plans)*

It is impossible to make an estimate as to the number and quantity of new aquaculture zones and physical plans. However, it is expected that the potential freshwater aquaculture zones shall be included into the spatial plans documentation, which shall significantly facilitate the procedure of opening new farms.

III. Improving Market Competitiveness of EU Aquaculture:

- *Assessment of the situation at the national level: the strengths and weaknesses of the national sector, existing R&D activities and production elements in which market competitiveness is required the most*

A SWOT analysis of the sector is shown in Chapter 3. The SWOT analysis and information on the existing research, educational and developmental activities are shown in the same chapter.

- *The key elements of the activities: the planned activities for establishing industry and R&D cooperation*

The planned activities are referred to in Chapters 3 and 5.

- *Values and indicators (e.g. the number of industry and R&D partnerships)*

The indicators are shown in Chapter 8.

IV. Promoting fair market competition for EU producers through the use of their competitive advantages

- *Assessment of the situation at the national level: producer associations, marking schemes, public perception of aquaculture*

The structure of the sector, market and public perception of aquaculture are shown in Chapter 4.

- *The key elements of the activities: activities for improving the image of aquaculture products in the EU (communications campaign, voluntary schemes, organic farming)*

The planned activities are referred to in Chapters 3 and 5, as well as Table 12.

- *The target objectives and indicators (for example % of organic or certified aquaculture)*

The indicators are shown in Chapter 7.

b) Management and Partnership

- ***Key contributions of the involved stakeholders (local administration and government, industry, stakeholders and NGOs)***

A number of key stakeholders have been consulted during the drafting of this document. Consultations with sector representatives (Croatian Chamber of Commerce, Croatian Chamber of Trades and Crafts and The Maritime Cluster), state and local authorities, as well as scientific and educational institutions, were performed in written form. In September 2012, a two-day seminar was held at which experts introduced administration and sector representatives with the manner of NSPA preparation. In January 2014, a two-day workshop was organized. Its objective was the exchange of ideas and establishment of priorities and activities. It was attended by representatives from the sector, state and local authorities, NGOs, as well as scientific experts.

The written exchange with sector representatives during the consultations resulted in significant contributions in the forms of opinions, sector plans and planned investments. In addition, information on available sector data with regard to production in specific segments was acquired. Key problems plaguing producers were also analysed. During the written consultations with representatives from other ministries information on some of the currently available data was acquired.

At the two-day workshop the discussion revolved around issues related to spatial planning and the legal framework for ensuring farming space. During this part of the consultations county representatives (Zadar County and Split-Dalmatia County) and representatives from agencies of state authorities significantly contributed (Croatian Waters and Agricultural Land Agency). During the consultations it was shown that there are differences in opinion amongst representatives from certain state authorities, especially when

it comes to the issue of water and agricultural land management. Some differences of opinion when it comes to the issue of strategic document drafting were also noticed.

During the written consultations some state authorities did not respond, which was also considered as a contribution to the NSPA drafting. The lack of response from certain bodies (ministries) hinted at the segments in which collaboration needs to be strengthened and in which the specificity and significance of the NSPA and aquaculture as a whole shall be highlighted.

In order to ensure that NSPA implementation involves all of the included stakeholders, continuous monitoring of its realization is planned through the work activities of the Committee. The proposal is that the Committee consists of representatives from all key stakeholder groups.

The questionnaires which were used for data collection may be found in Appendix 5.

- ***The link containing the information on EMFF OP priorities and financial allocation (EMFF and other EU or national funds)***

These links with OP are shown in Table 12., and the final allocations to aquaculture measures is contained in the OP.

c) ***Best practices***

Best national practices:

1) Determining the location for marine farming on the basis of the ICZM (*see Chapter 4.*)
2) The procedure for the impact assessment of the marine farming on the environment.
3) The complete procedure for the granting of permits to marine farming, including all of the activities preceding the granting of that permit.

Table 12: Objectives, priorities, specific objectives, activities and measures

	GENERAL OBJECTIVE	PRIORITY AREA	PRIORITY	SPECIFIC OBJECTIVE	ACTIVITY AND MEASURE
1	**Strengthening of the social, business and administrative environment for the development of aquaculture**				
		1.Legal Framework and Administration			
		Priority 1.1	Simplification of administrative procedures	Shortening the time necessary for the implementation of overall administrative procedures	Amendments to the existing regulations Preparation of new regulations Preparation of necessary guidelines
		Priority 1.2	Improvement of the data collection system	Improvement of overall statistics	Adaptation of the electronic MP database
		2. Spatial Positioning of Activities and Spatial Planning			
		Priority 2.1	Ensuring sustainable development and growth through coordinated spatial planning and ensuring of the necessary farming locations, locations for the accompanying infrastructure, ensuring the adequate quantity of water for fresh water aquaculture	Including aquaculture zones in spatial plans Stable production in accordance with environment and nature protection	Defining the necessary criteria for freshwater aquaculture locations Defining aquaculture zones Ensuring the adequate quantity and quality of water for fresh water aquaculture in accordance with nature and environment protection and Water management plan
		5. Market and Competitiveness			
		Priority 5.2	Improvement of the cooperation between the industry and the institutions for scientific research and development	Establishment of applied research	Establishment of a communication platform
2	**Increase of total production to 24,050 tonnes while adhering to the principles of economic, social and ecological sustainability**				
		3.Environment and Nature			
		Priority 3.1	Application of environmentally acceptable technologies	Ecological sustainability	Enhancement of technologies that result in lower water usage and/or in lesser organic load into the water-flow. Enhancement of technologies that shall prevent escapees. At NATURA 2000 sites apply measures that shall prevent escapees. Introduction of new farming technologies.
		Priority 3.2	Protection from predators and compensation for damage caused by predators	Economical sustainability of production	Establishment of a compensation system Equipping of farms against predators

		4. Health of farmed Organisms			
		Priority 4.1	Determining and implementing disease prevention and control and the welfare of the farmed aquatic animals protocols	Improvement of the prevention of disease of farmed organisms	Preparation of necessary protocols Organization of workshops and seminars
		Priority 4.2.	Epidemiological zoning river basins and marine areas for fish and shellfish farming for the purpose of free movement of aquaculture products	Free traffic of aquaculture products	Zoning Determining the health status of individual zones
		5.Market and Competitiveness			
		Priority 5.1	Diversification of production and introduction of new species into farming		
				Fish hatcheries *Increase of production to 40,000,000 juvenile fish while adhering to the principles of economic, social and ecological sustainability*	
					Modernization and reconstruction of existing hatcheries
					Building new hatcheries and ongrowing units on land
					Selective breeding
				Fish farms (except tuna) *Increase of production to 10,000 tonnes while adhering to the principles of economic, social and ecological sustainability*	
					Modernization and reconstruction of existing farms
					Establishment of new farms
					Development and introduction of new farming technologies
					Development and introduction of farming recirculation systems (RAS) on land
					Adding new value through processing
					Improvement of product quality
					Decreasing the negative impact of farming activities on nature and environment
					Polyculture farming
					Increase of production at existing locations along with maintaining or decreasing the intensity of impact on the environment
				Tuna farms *Production of min 3,000 tonnes depending on fishing quotas, zootechnical and market options*	
					Modernization and reconstruction of existing farms
					Modernization and introduction of new farming technologies
				Marine rainbow trout farms *Commercial production while adhering to the principles of economic, social and ecological sustainability*	
					Development and introduction of farming technology
				Shellfish hatcheries	

				Production of a minimum of 20,000,000 juvenile while adhering to the principles of economic, social and ecological sustainability	
					Building shellfish hatcheries
					Adopting technologies for producing juvenile European flat oyster (*Ostrea edulis*), juvenile scallop (*Pecten jacobaeus*) and other shellfish juvenile
				Shellfish farms *Increase of production to 5,000 tonnes while adhering to the principles of economic, social and ecological sustainability*	
					Establishment of new farms
					Establishment of wastewater control in shellfish farming areas
					Improvement of technologies in oyster and mussel farming
					Adding new value through processing
					Construction of distribution and purification centres
					Determining oyster spawning grounds and improving the technology of collecting juvenile fish from the environment
					Establishment of a compensation system in case of temporary harvesting suspension, solely for the purpose of protection of public health
				Hatcheries and nurseries of warm water species *Increase of juvenile fish production while adhering to the principles of economic, social and ecological sustainability*	
					Building new hatcheries and nurseries
					Modernization and reconstruction of existing hatcheries and nurseries
					Selective breeding
				Warm water species farms *Increase of production to 5,000 tonnes while adhering to the principles of economic, social and ecological sustainability*	
					Modernization and reconstruction of existing farms
					Establishment of new farms
					Improvement and introduction of new farming technologies
					Ensuring sustainability within the NATURA 2000 area
					Building the accompanying infrastructure
					Adding new value through processing and diversification of activities (multifunctional farms)
					Reconstruction of existing poorly tended farms
					Selective breeding
				Cold water species hatcheries	

				Increase of juvenile fish production while adhering to the principles of economic, social and ecological sustainability	
					Modernization and reconstruction of existing hatcheries
					Building new hatcheries
				Cold water species farms *Increase of production to 1,050 tonnes while adhering to the principles of economic, social and ecological sustainability*	
					Modernization and reconstruction of existing farms
					Establishment of new farms
					Improvement and introduction of new farming technologies
					Building the accompanying infrastructure
					Adding new value through processing and diversification of activities
		Priority 5.3	Enabling the farming of other aquatic organisms, besides fish and shellfish		Ensuring the necessary legal framework
		Priority 5.4	Insurance of farmed organisms		Establishment of an insurance system
3	**Improvement of perception and increase of national consumption of aquaculture products**				
		5.Market and Competitiveness			
		Priority 5.5	Establishment of producer organizations	Organized appearance on the market	Organization of workshops and seminars Registration of POs
		6.Perception and Communication			
		Priority 6.1	Increasing competitiveness, certification, branding	Informing the public	Defining the brand Establishment of a certification system in aquaculture
		Priority 6.2	Development of domestic market, marketing strategy and promotion of aquaculture products, along with improvement of communication with consumers	**Improvement of perception of aquaculture products**	Establishment of the system for testing the domestic market Preparation of a unique marketing strategy for the domestic market Establishment of a platform for communication with consumers
		7.Education and Employment			
		Priority 7.1	Continuous general education and information of participants in aquaculture with special concern for the health and welfare of aquatic animals, aquaculture waste management (in terms of waste reduction), along with strengthening the role of Advisory Services	Improvement of production Improvement of the prevention of disease of farmed organisms Decrease of environmental and nature impact	Preparation of manuals and guidebooks Organization of workshops and seminars
		Priority 7.2	Working conditions improvement	Stability of production	Establishing a trade union of aquaculture employees Defining specific work safety standards
		Priority 7.3	Increasing employment	Increase of production	Creating new jobs

7. Financing and Implementation

a) *European Maritime and Fisheries Fund (EMFF) 2014 -2020*

The European Maritime and Fisheries Fund is the key mechanism for financing the implementing of objectives from the NSPA. This mechanism encompasses the financing of a number of measures in aquaculture, processing and market promotion of aquaculture products. The financing of measures referred to in this NPA shall be performed with measures related to EU Priority 2 (ensuring an ecologically sustainable, efficient, innovative, competitive and knowledge-based aquaculture), measures related to EU Priority 5 (ensuring market promotion and processing of fishery and aquaculture products) and measures related to EU Priority 6 (ensuring the implementation of an integrated maritime policy). Depending on the final structure and decision on implementation of measures for local initiatives (CLLD), measure related to EU Priority 4 used (increasing employment and territorial cohesion) shall be implemented.

b) Other

In addition to funds from the EMFF, the use of other ESI funds is envisaged (primarily EFRD and EAFRD) and partially Horizon 2020 to finance a part of the activities aimed at achieving NSPA objectives. The synergy with EFRD is primarily visible through the financing of administrative capacity strengthening and building (at the horizontal level of RC) and partially in the financing of related projects from the fields of environmental protection, spatial planning and infrastructure (primarily in the financing of harbours and coastal zones), as well as waste management. The synergy with EAFRD is primarily and partially visible in the development of rural tourism where connection may be established without overlapping financing. When it comes to R&D projects with a potentially significant research scope, we plan to finance it from the Horizon 2020 framework.

As part of implementation, some financing on the national level is foreseen through de minimis aid and block exemption aids. At the time this document was drafted there was no legal framework of state aid that could be considered acceptable or exempt from notification so this segment shall be included into the NSPA and the NSPA implementation in an appropriate manner in the later phases.

c) Funds necessary for Implementation

The funds necessary for achieving NSPA objective shall be defined within the framework of the Operational Programme for Fishery from 2014 to 2020.

d) Indicators

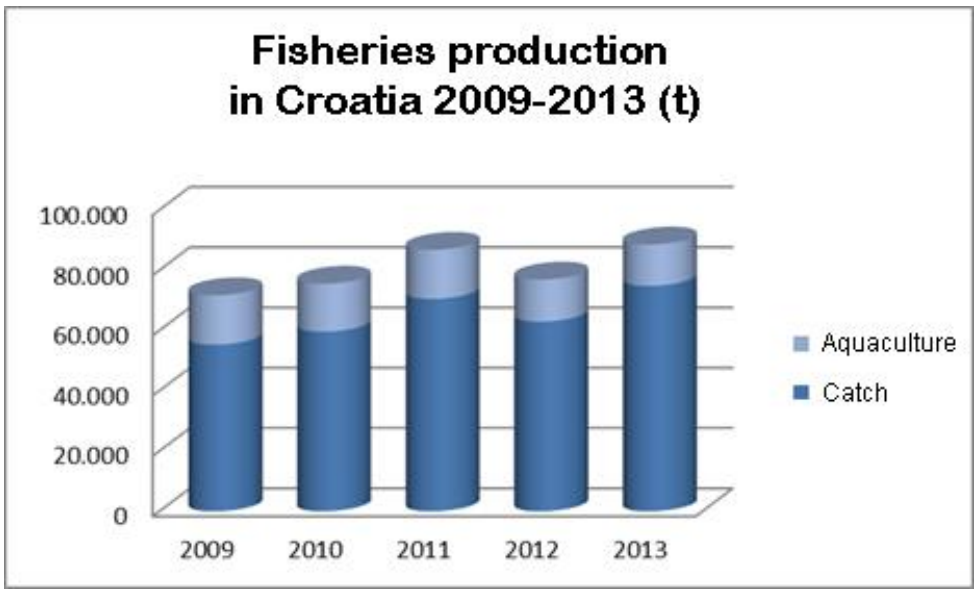
The indicators will be defined in the framework of the Operational Programme.

APPENDIX 1 TRENDS AND ANALYSES

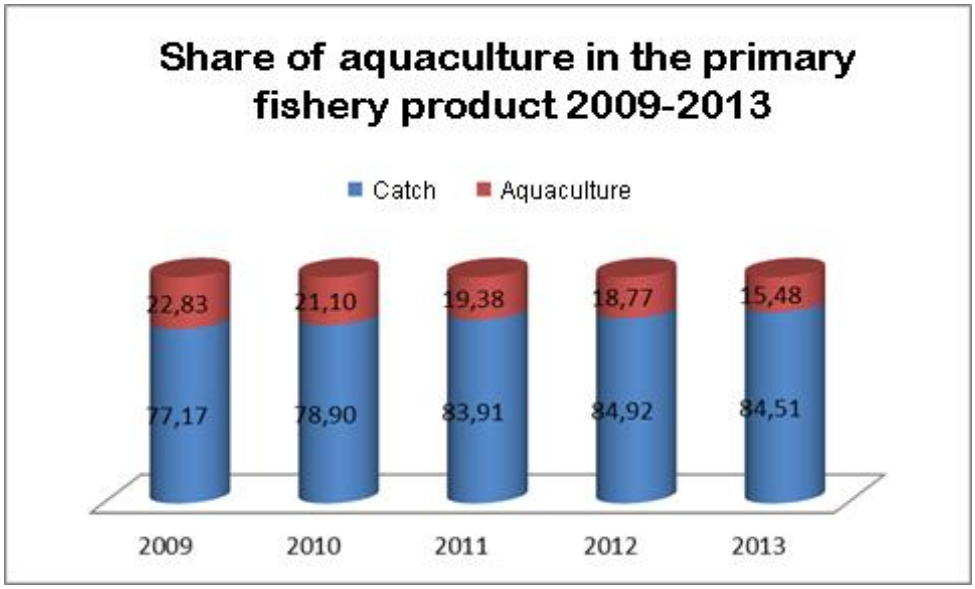
Analysis of the available data on aquaculture for the 2003-2013 period with special emphasis on 2013

1. Aquaculture in the total fishery product of the Republic of Croatia

In the last five years in aquaculture production shows an positive trend until 2011, followed by a decline in 2012 and again growth in 2013, as a result of fluctuations in tuna production due to fishing restrictions and because of the fall of freshwater production. The share of aquaculture in total output of fisheries (primary production) by 2010 exceeds 21%, which is higher than 20.4% of the EU average. In the past two years the share falling to around 15%, mainly due to the decline in production of tuna, but also due to the increase in fish catches.

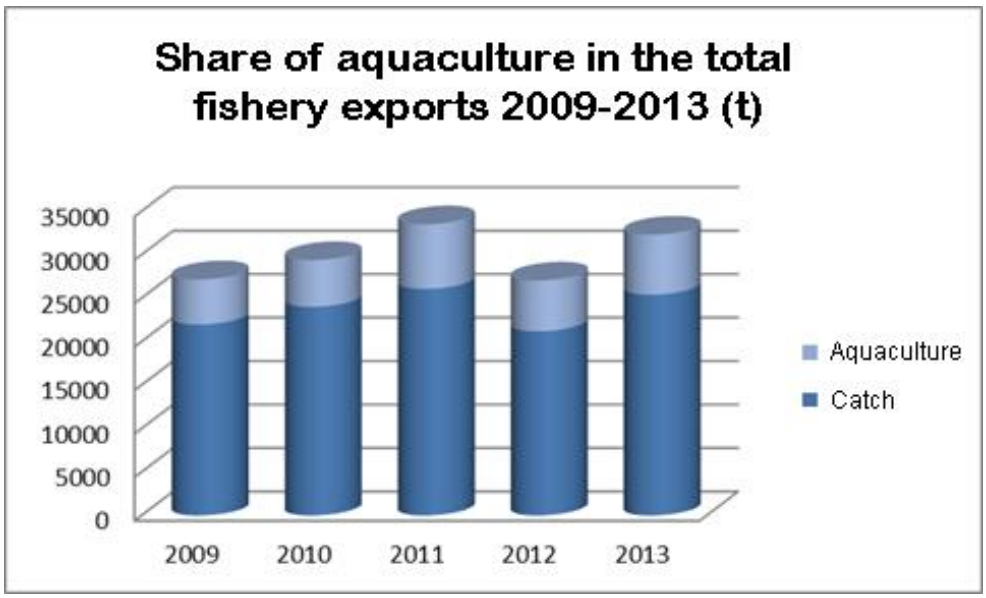


Source: MA

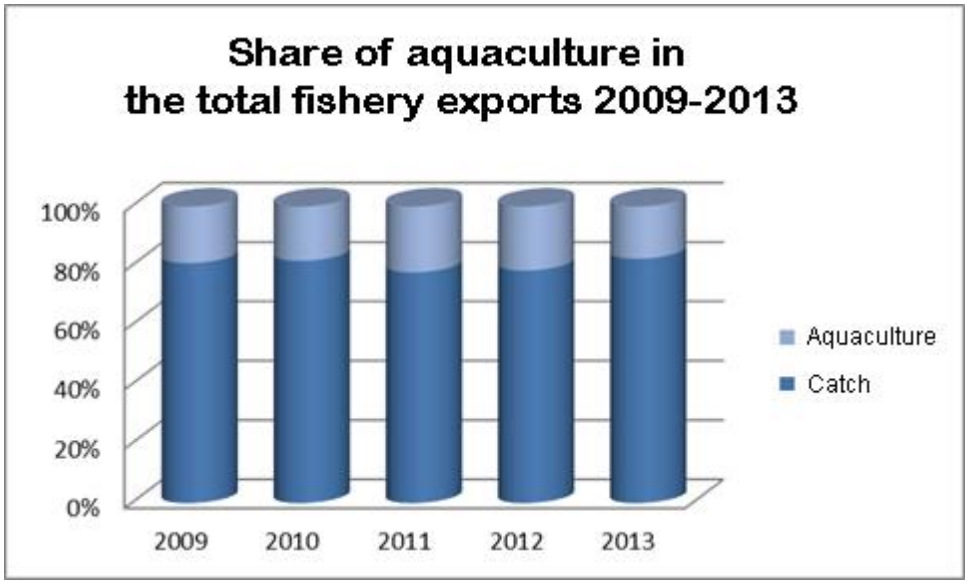


Source: CBS

In the previous five-year period the amount of exported aquaculture products had been increasing and reached the maximum of 7,440 tonnes in 2011, thanks to tuna export. In 2012 there was a decline in export, due to the decline in tuna farming. The share of aquaculture in the total amount of fishery product exports has been increasing continuously and it reached 22% in the last two years.

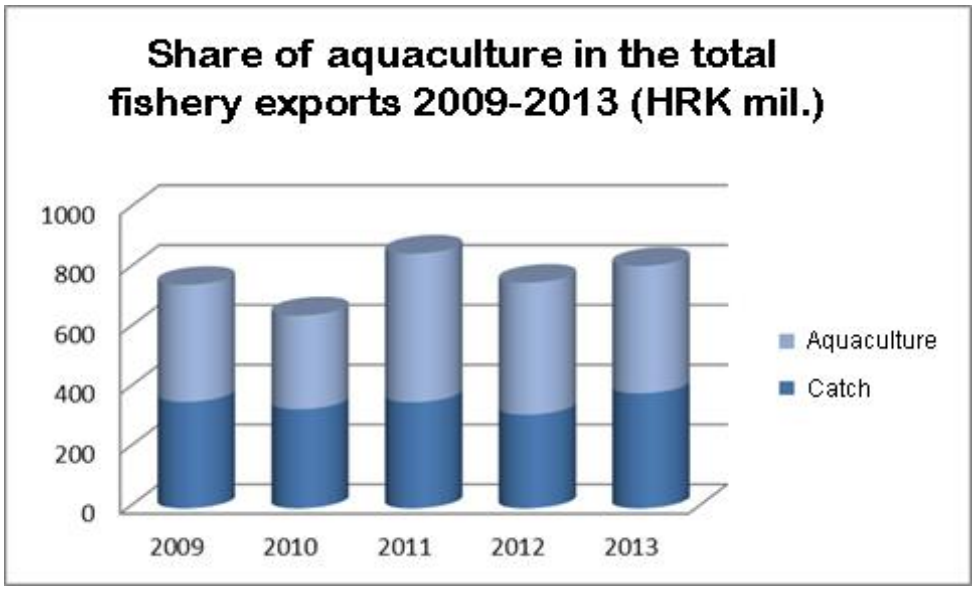


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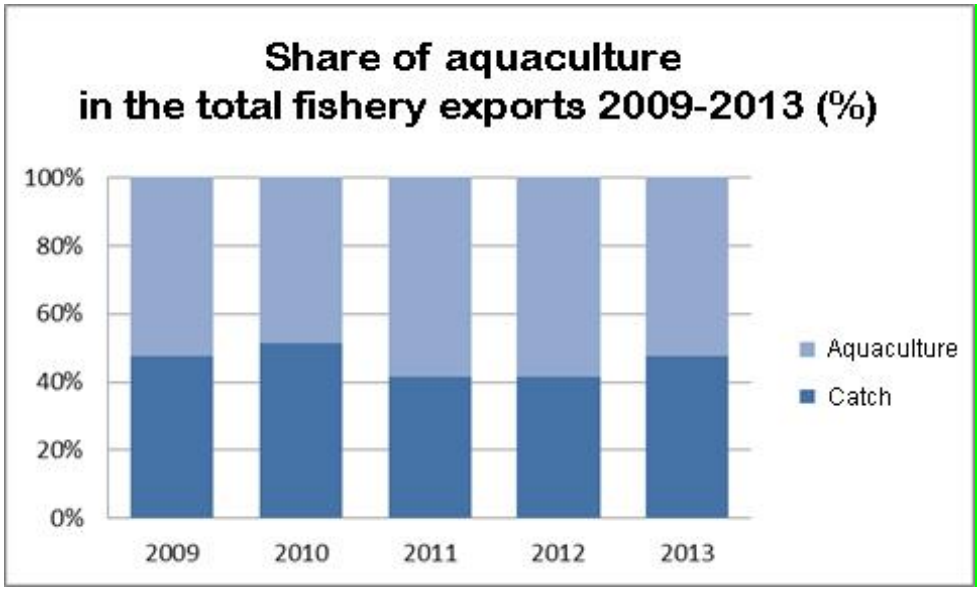


Source: CCE

The value of exports of aquaculture products has been increasing continuously and it reached almost HRK 500 million in 2011, while there was a slight decline in 2012 due to a decline in tuna export. The share of the value of aquaculture product in the total value of fishery product export has been increasing continuously and it amounted to 58% in the last two years.

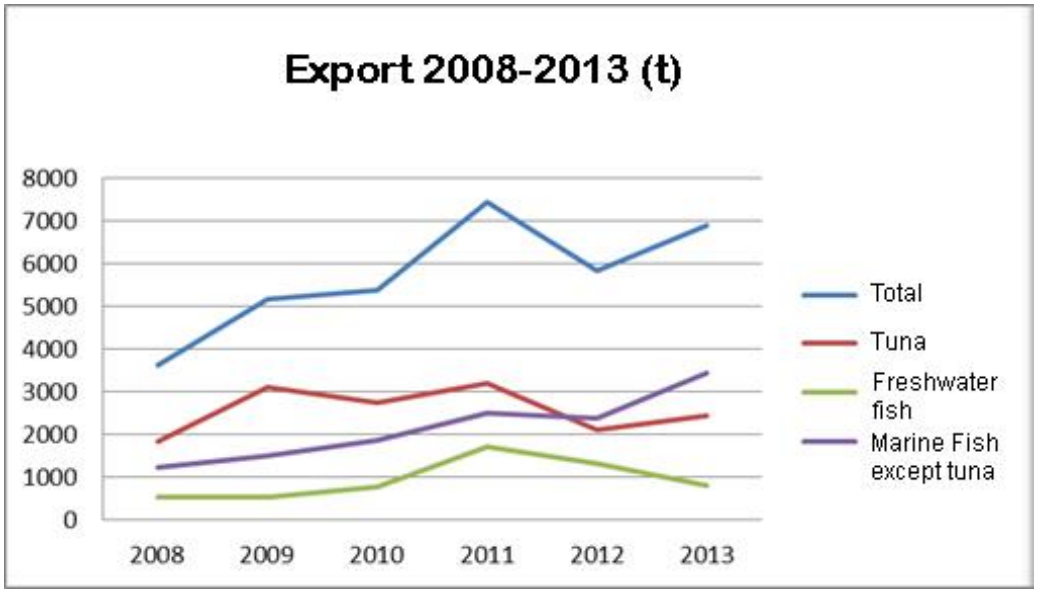


Source: CCE

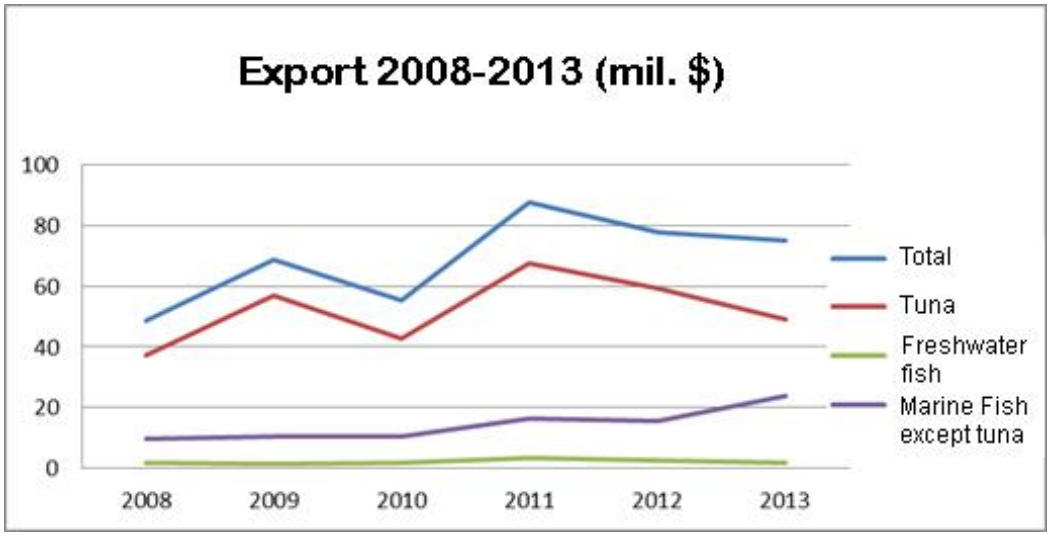


Source: CCE

Considering the export of aquaculture products in the previous five-year period according to species, it is evident that the export of marine fish (except tuna) and freshwater fish has increased continuously until 2011, both in amount as well as in value, after which there was a slight decline. The biggest decline in exports was recorded in 2012 for tuna, both in amount as well as in value due to decline in production.



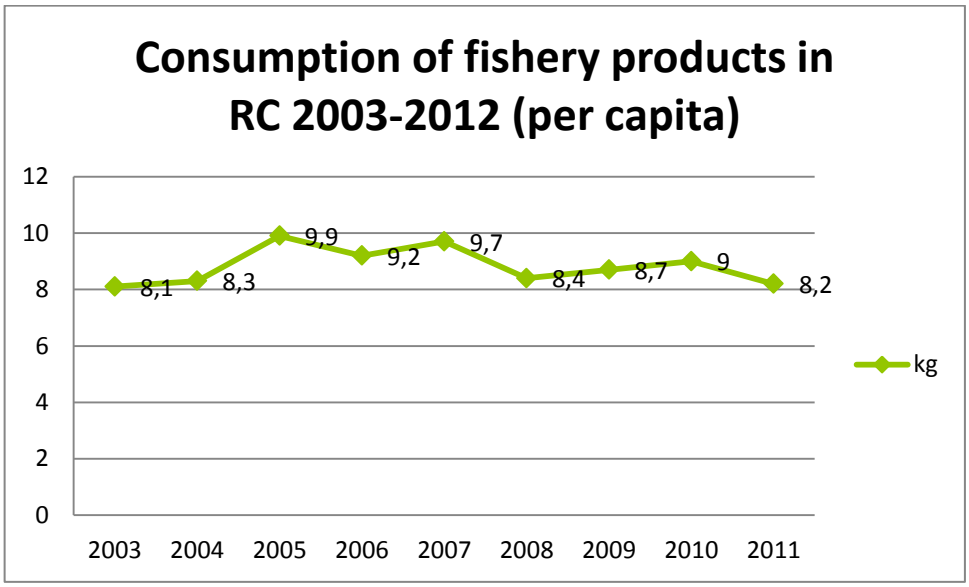
Source: CCE



Source: CCE

2. Consumption of fishery products in RC

The consumption of fishery products in RC ranges from 8-9 kg per capita, with two peaks - 9.9 and 9.7 kg in 2005 and 2007, which is well below than the EU average of 23 kg per capita.

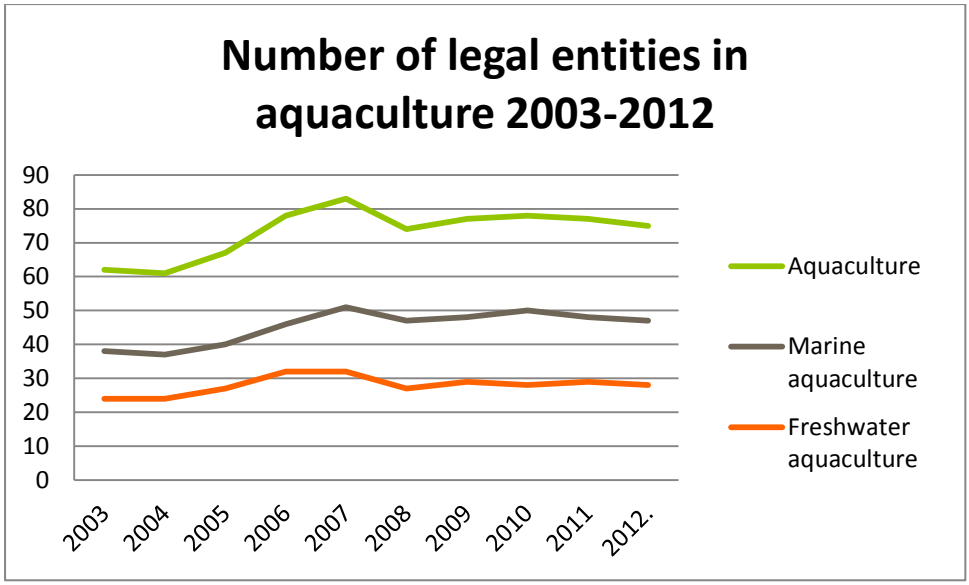


Source: CBS

3. Companies engaged in aquaculture

There are no statistical data on the number of natural persons engaged in aquaculture for the previous period, but 104 natural persons were engaged in this activity in 2012.

The number of legal entities shows the same trends in marine and freshwater aquaculture, which is a steady increase up to a maximum of 83 total in 2007, followed by a decline to 74 in 2008, and after that, stagnation, in the range of 75-78.

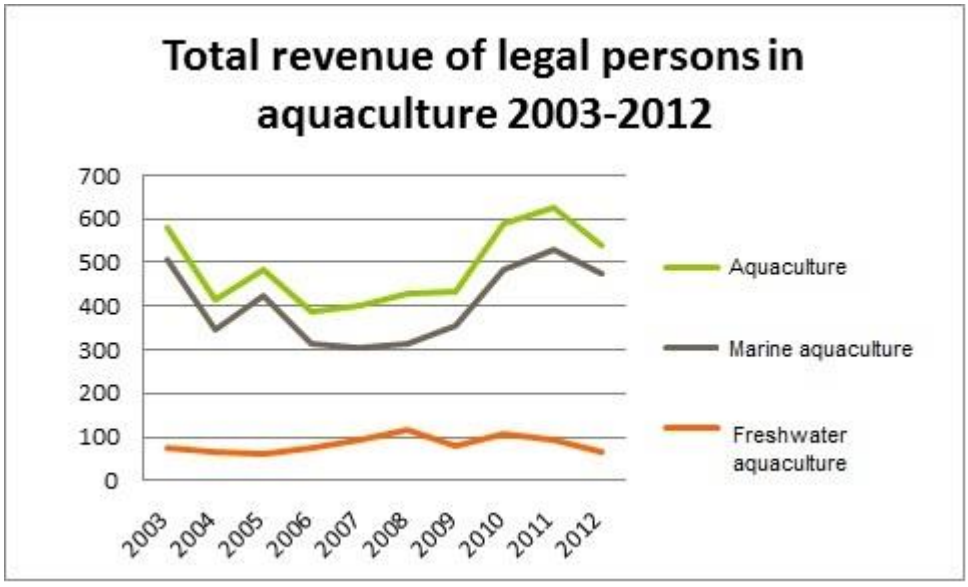


Source: CCE

4. Total revenue in aquaculture

There are no statistical data on the total revenue of natural persons engaged in aquaculture for the previous period.

The total revenue of legal entities in 2003 amounted to almost HRK 580 million, followed by a decline in the period from 2004 to 2010, when it amounted to HRK 400-500 million. The increase to 600 million is evident in 2010 and 2011, while there was again a decline to HRK 540 million in 2012. Revenue in freshwater aquaculture ranged around HRK 60-70 million until 2007, when it rose to approximately HRK 100 million, until 2012, when it slipped again to HRK 65 million. In mariculture, the total revenue in 2003 amounted to HRK 500 million, and in the next period it ranged from HRK 300 million to HRK 400 million, until 2010, when it rose again. Since then, it has retained the value of about HRK 500 milion.

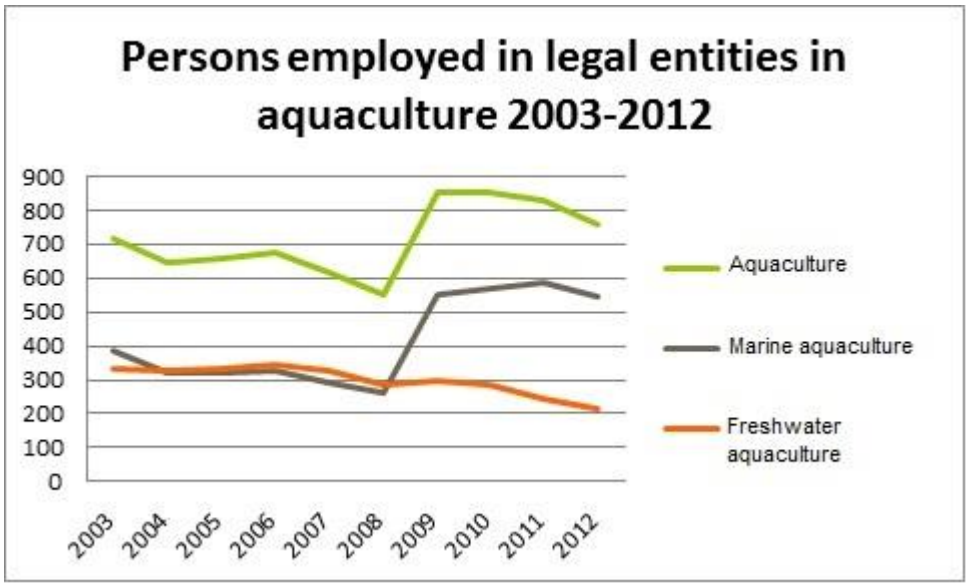


Source: CCE

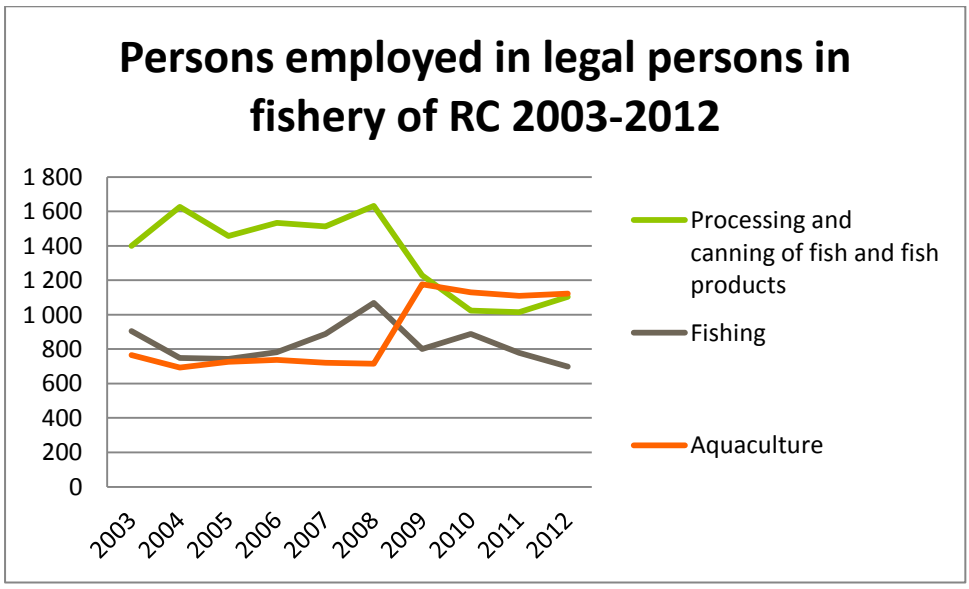
5. Persons employed in aquaculture

The total number of persons employed in aquaculture varies in relation to the data source. According to the data of CCE, the total number of employees ranged from 600 to 700 in the period until 2009, when it rose to 850 for the next three years and then slipped to 760 in 2012. According to the data of the Croatian Bureau of Statistics (CBS), the number of persons employed in aquaculture generally exceeded 700 in the 2003 – 2009 period, after which it rose to around 1200 in the period until 2012.

According to the data of CCE, the number of persons employed in mariculture and freshwater aquaculture was uniform until 2009, when there was employment growth, from 300 to more than 500 people in the period until 2012, while the number of people employed in freshwater aquaculture declined steadily from 300 in 2009 to 200 in 2012.

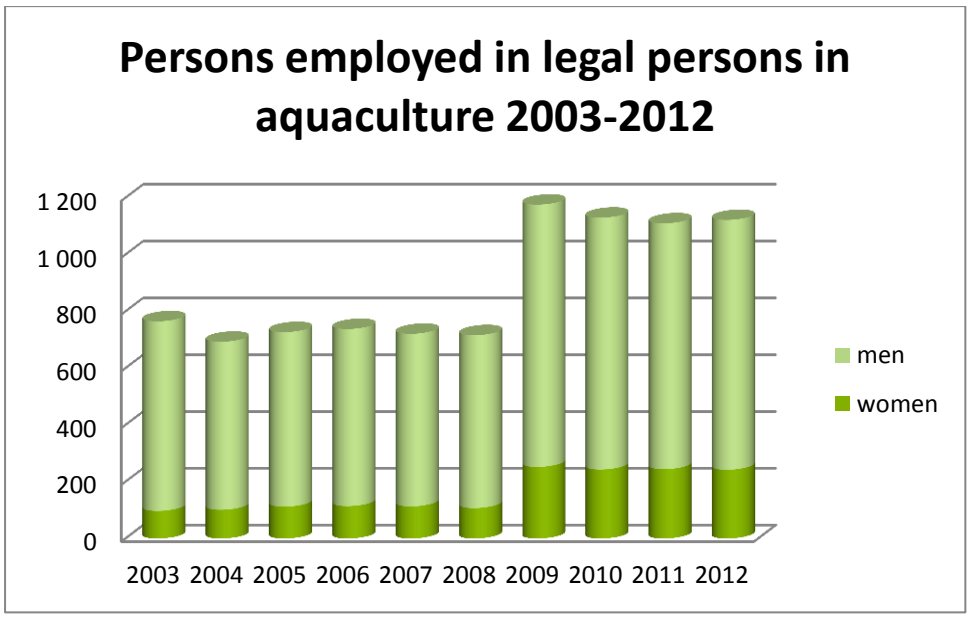


Source: CCE



Source: CBS

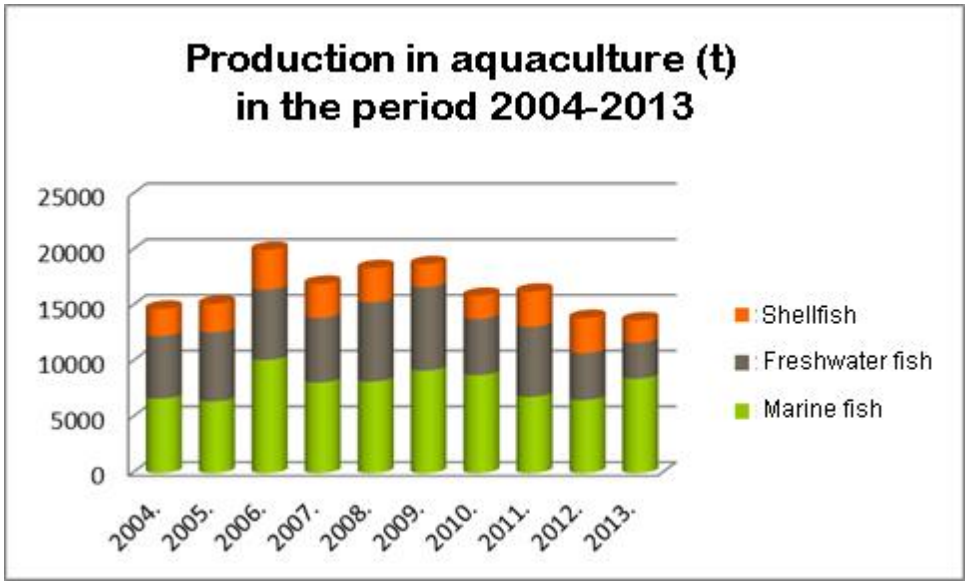
The relation between the number of employed men and women in aquaculture is increasing in favour of women, from 12.6% in 2003 to 21.5% in 2012.



Source: CBS

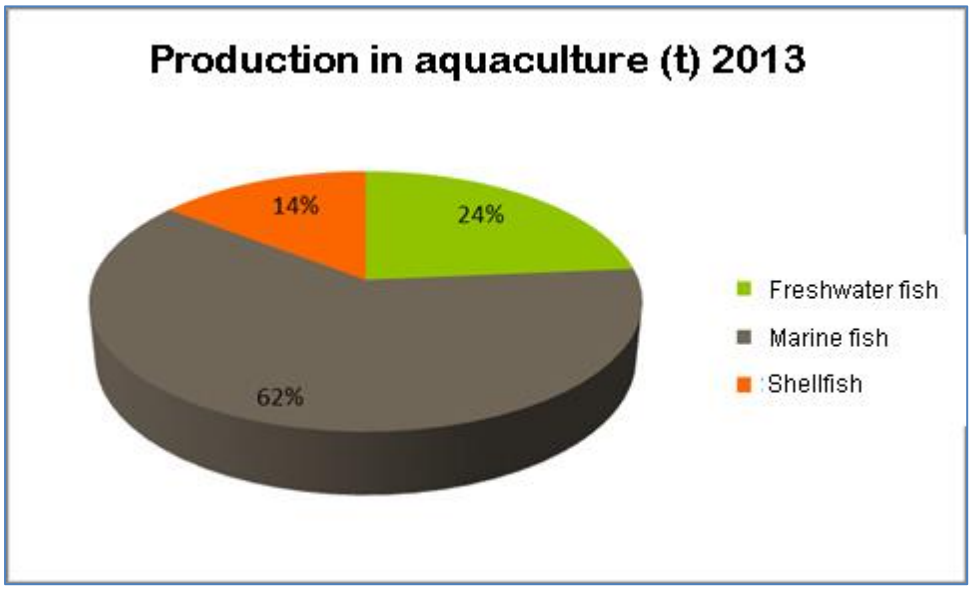
6. Total production in aquaculture

The total aquaculture production amounted to around 15,000 tonnes until 2006, when, due to the increase of tuna farming, it grew to more than 20,000 tonnes. After that, due to tuna fishing restrictions, it declined to 17 - 19,000 tonnes, and finally to 13,916 tonnes in 2012. Freshwater farming reached a maximum of more than 7,000 tonnes in 2008 and 2009, followed by a decline to 3.235 tonnes in 2013. This decline in production in warm water fish farming is for the most part just a result of a new method of presenting statistical data, that is, only fish that was placed on the market was shown. A decline in parts of cold water fish farming was also recorded which is considered to be realistic.



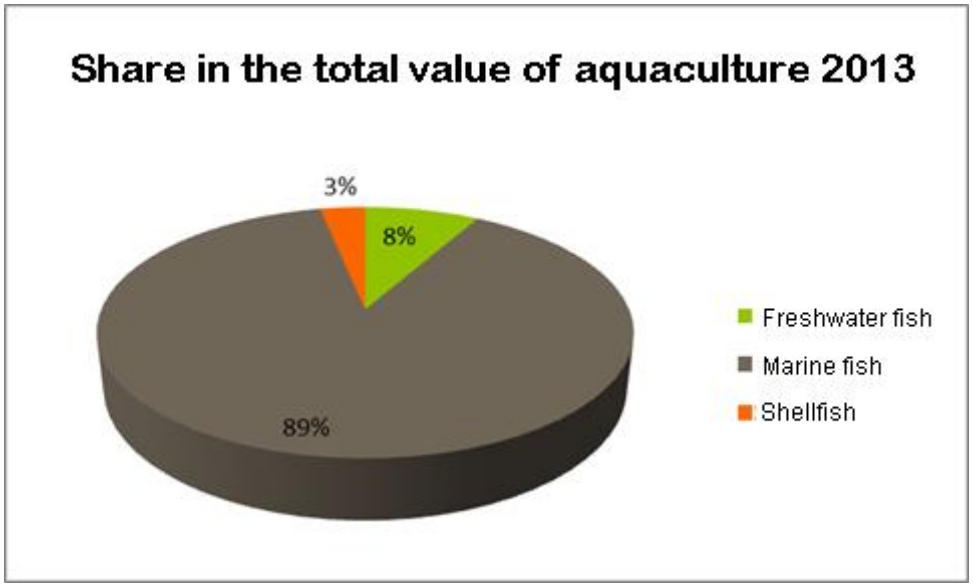
Source: MA

In the total aquaculture production, marine fish is the most represented, amounting to 62%, while freshwater fish represents a share of 24%, and shellfish represent 14%.



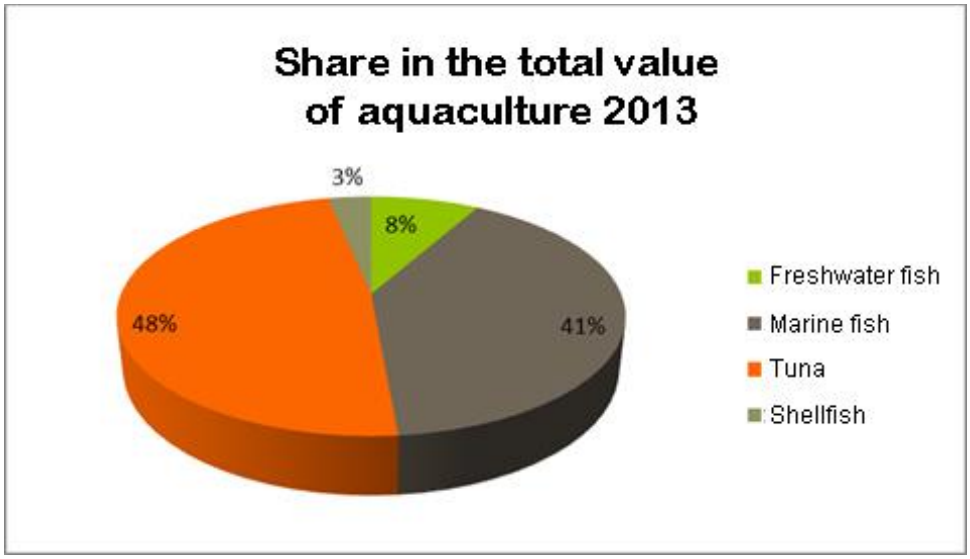
Source: MA

The share in the total value amounts to as much as 89% for marine fish, 8% for freshwater fish and 3% for shellfish.



Source: MA

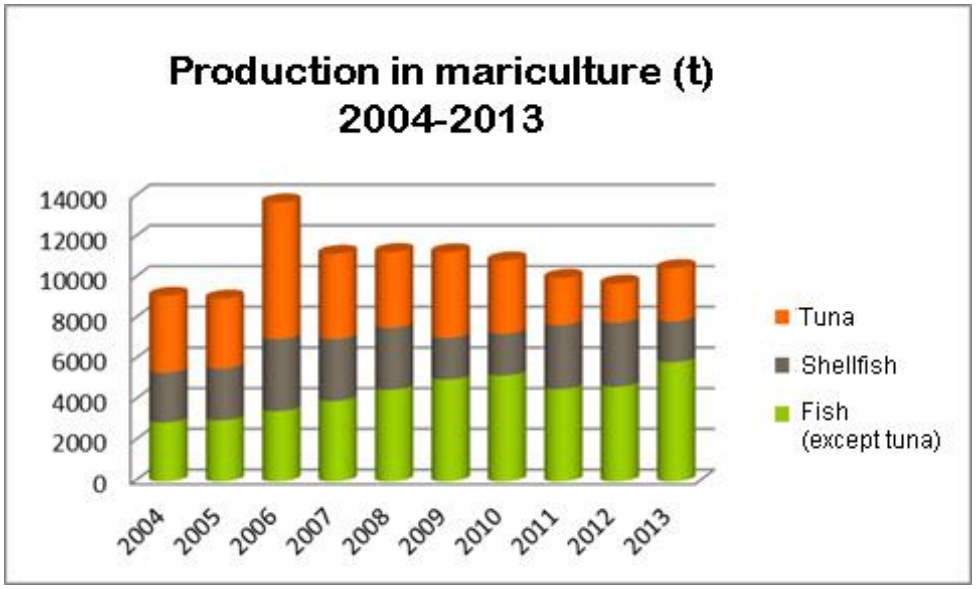
If tuna is singled out, it is evident that it participates in the total value with as much as 48% .



Source: MA

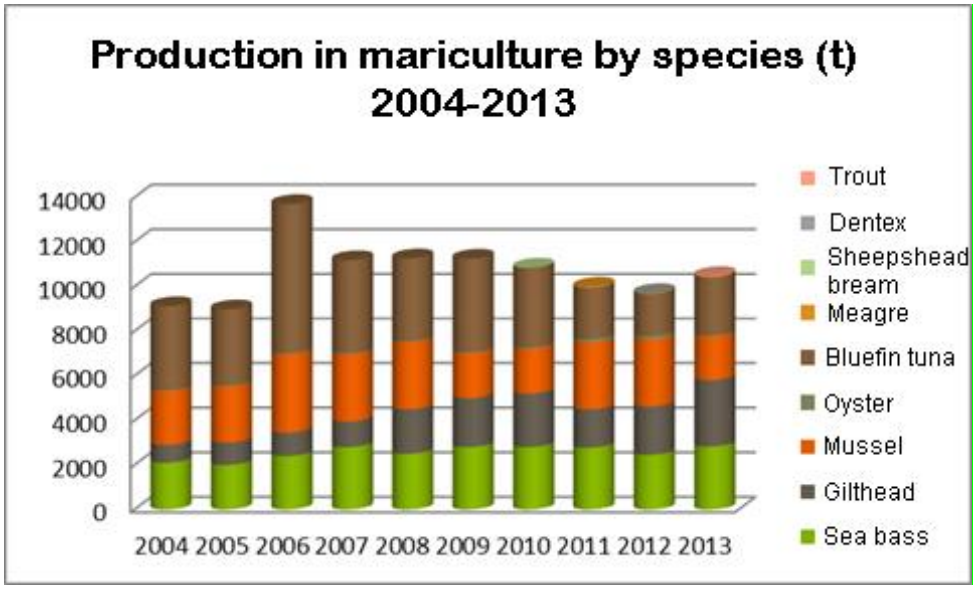
7. Production in mariculture

The total production in mariculture increased from 9-10,000 tonnes in 2003 to 13,700 tonnes in 2006, due to the increase in tuna farming. After that production stabilized at around 11,000 tonnes in the 2007 – 2010 period, with a steady increase in fish farming and a steady decline in tuna farming, until the final 10,474 tonnes in 2013.



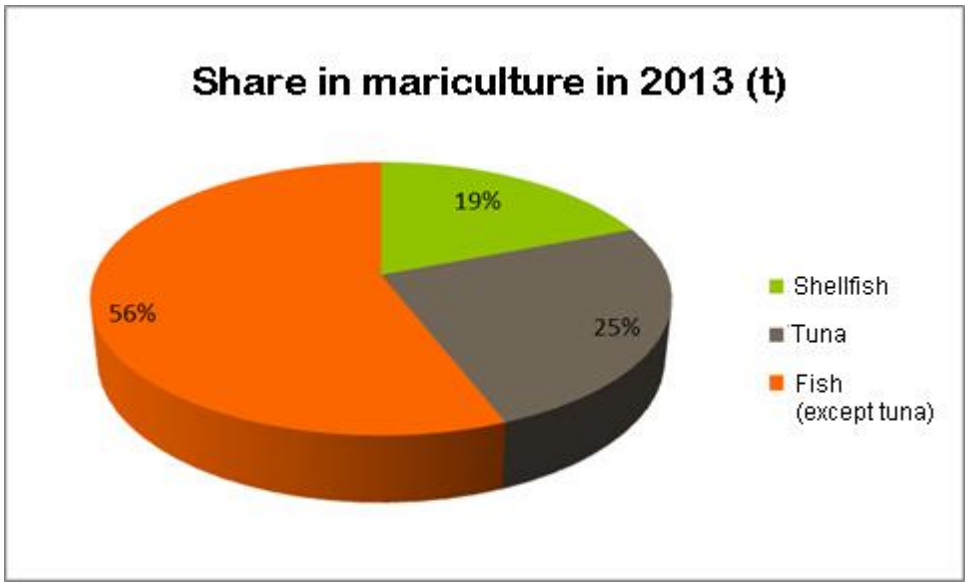
Source: MA, CCTC

The production of sea bass increased from 1,702 tonnes in 2003 to 2,826 in 2013. The production of gilthead bream increased from 808 tonnes in 2003 to 2,987 tonnes in 2013. Meagre has been produced since 2010 with production of 44 tonnes in 2013, and production of dentex starts from 2012 and in 2013 reach 6 tonnes. The production of sheepshead bream was recorded only in 2010. The production of European flat oysters amounted to approximately 50 tonnes. The production of Mediterranean mussels reached a maximum of 3,500 tonnes in 2006, followed by a decline to 2,000 tonnes in 2009 and 2010, and 1950 tonnes in 2013.



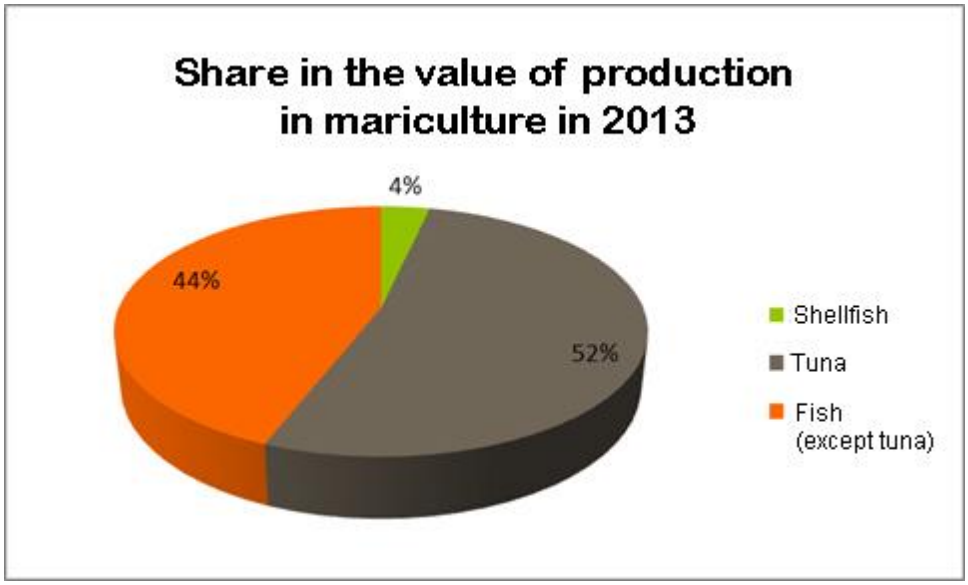
Source: MA, CCTC

In 2013, fish represented 56% of the total mariculture production, while tuna accounted for 25%, and shellfish for 19% in quantity.



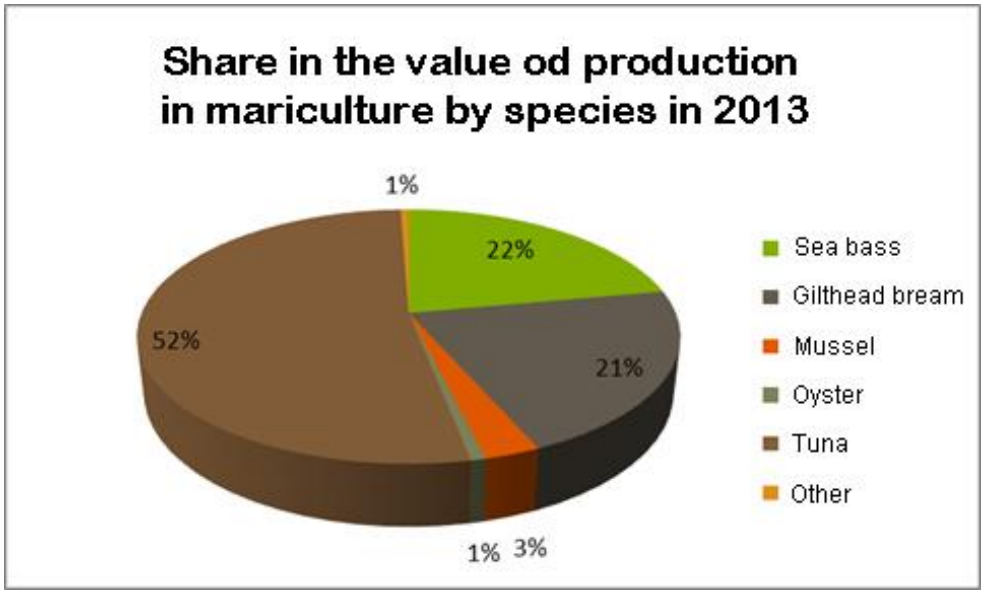
Source: MA, CCTC

In terms of production value, tuna accounts for 52%, fish to 44%, and shellfish to 4%.



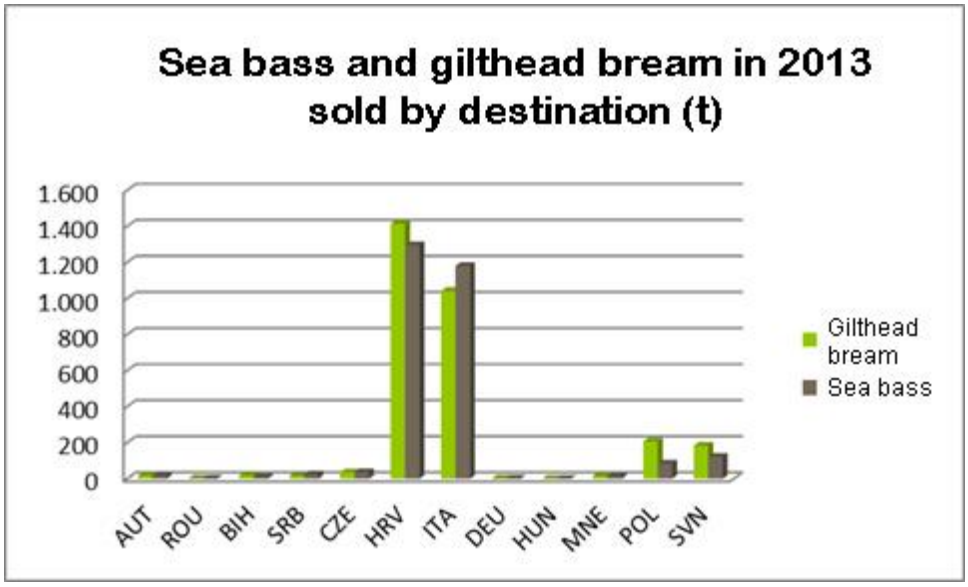
Source: MA

If production value by species is considered, tuna accounts for 52%, sea bass is represented with 22% and gilthead bream with 21% of total production.



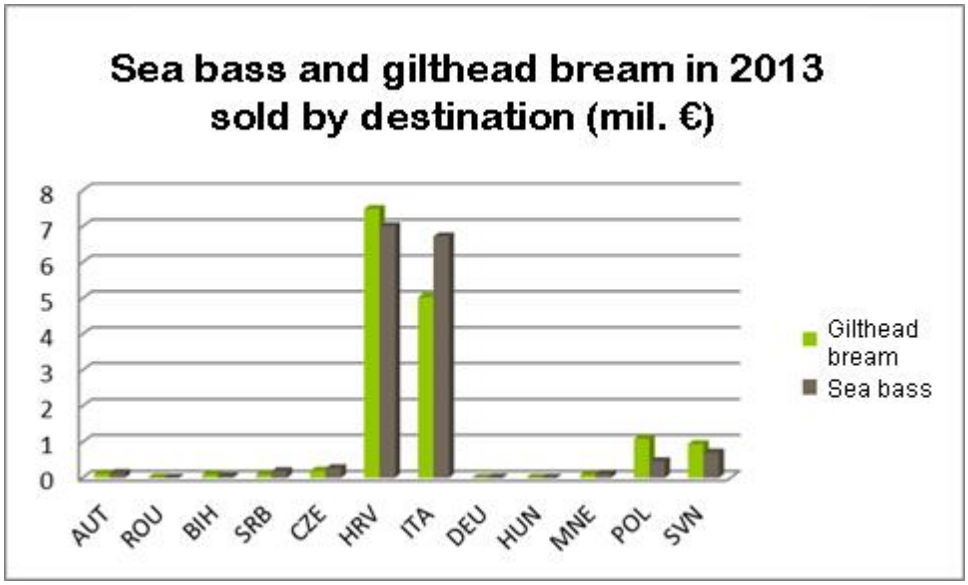
Source: MA

The largest part of the production of sea bass and gilthead bream is placed on the domestic market and the market of the EU - Italy. It is important to emphasize that, until 1 July 2013, the Republic of Croatia was under the regime of export quotas for these products to the EU market. In 2013 export to Poland and Slovenia shows significant increase.



Source: MA

The average achieved price for sea bass and gilthead bream on the domestic market and the EU market was slightly higher in favour of the market of the Republic of Croatia. The price for sea bass in Croatia is € 5.28, while in Italy it amounts to € 5.16. The average price of gilthead bream on the market of the Republic of Croatia is € 5.12, and € 4.99 on the Italian market.

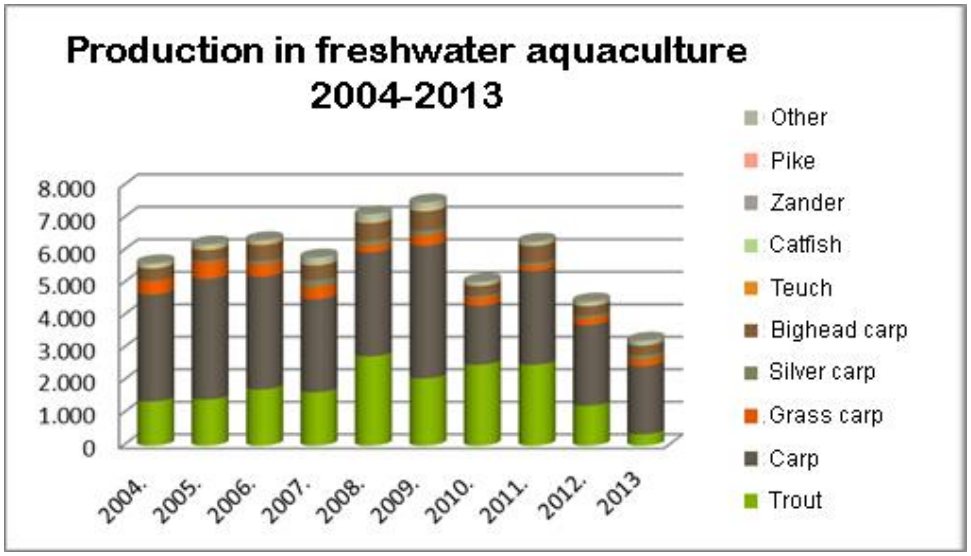


Source: MA

8. Production in freshwater aquaculture

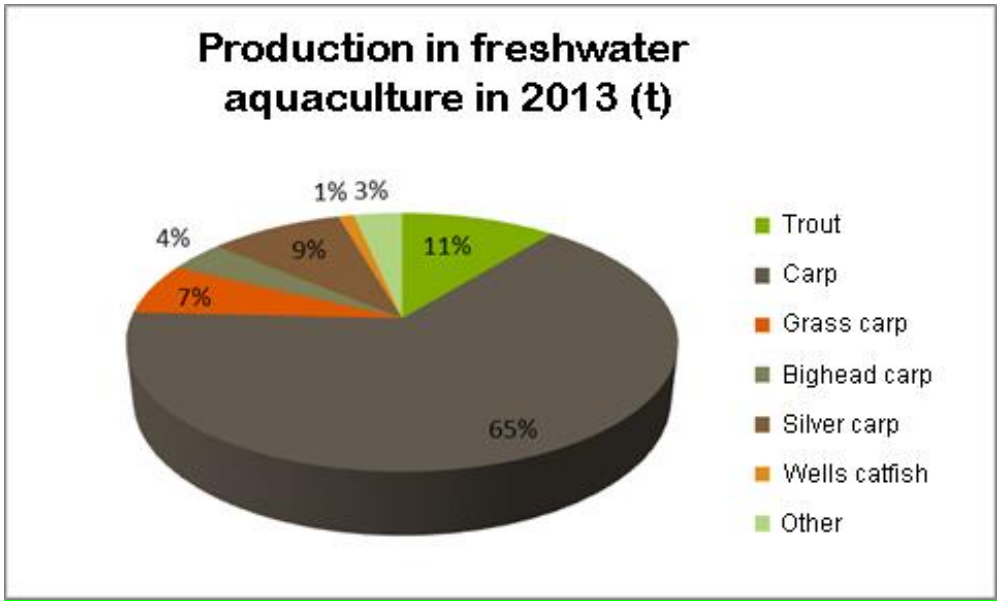
Freshwater aquaculture production reached its maximum of 7,488 tonnes in 2009, which was followed by a decline, as a result of new methods of keeping production statistics, and also as a result of a real decline of production. In carp production there have been ups and downs, and it generally moved around 3,000 tonnes until 2009, when it reached 4,088 tonnes, followed by a decline until the final 2,100 tonnes in 2013.

Production of trout reached a maximum of 2,752 tonnes in 2008 and then falling to the final 351 tons in 2013.



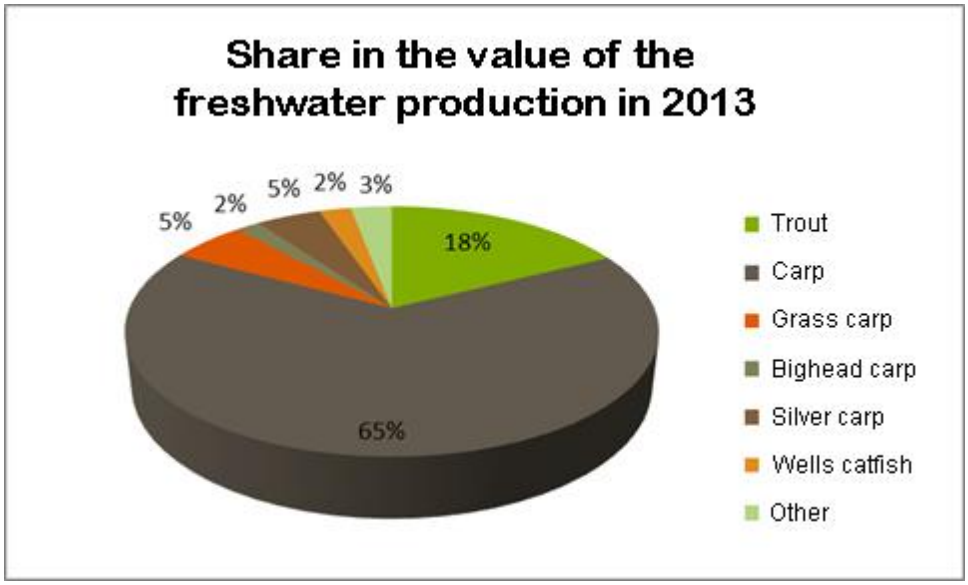
Source: MA

In 2013 the share of carp in the total production was 65%, trout accounted for 11%, while all other species individually account for about 24%.



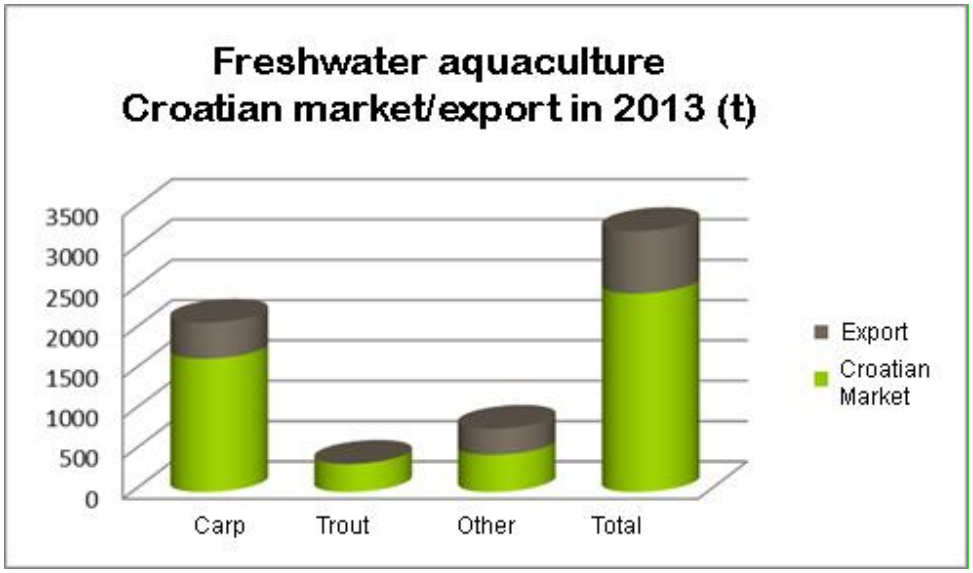
Source: MA

If the production value in 2013 is observed, the relations are slightly different in favour of the trout, so the share of carp in the total value amounts to 65%, and the share of trout to 18%.

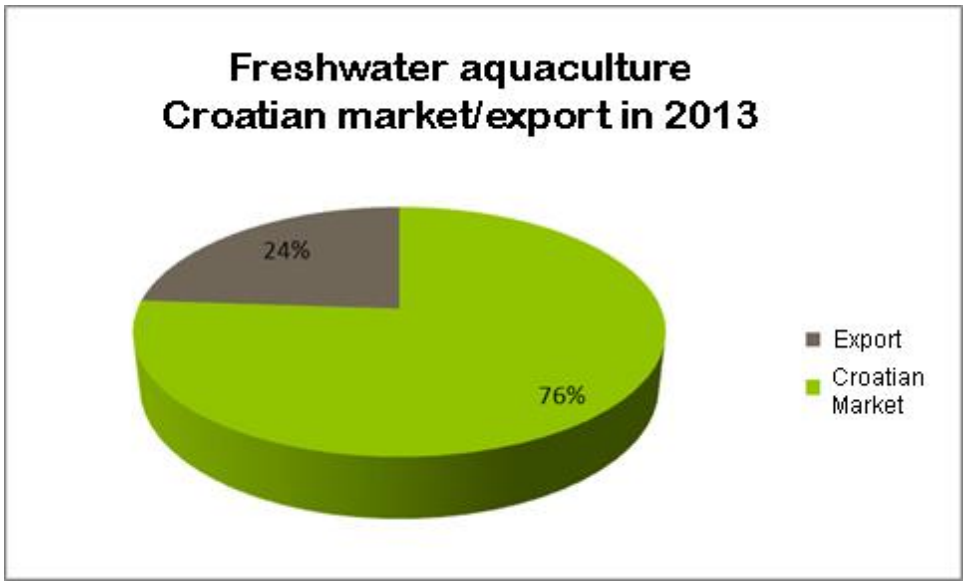


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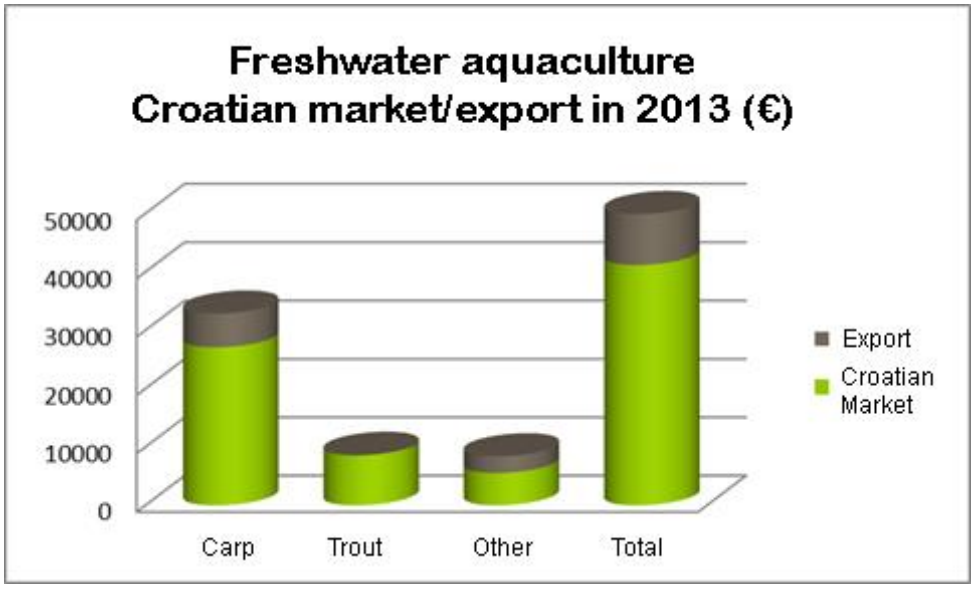
In 2013, 76% of the total production was placed on the domestic market, which amounts to 83% of the total production value.



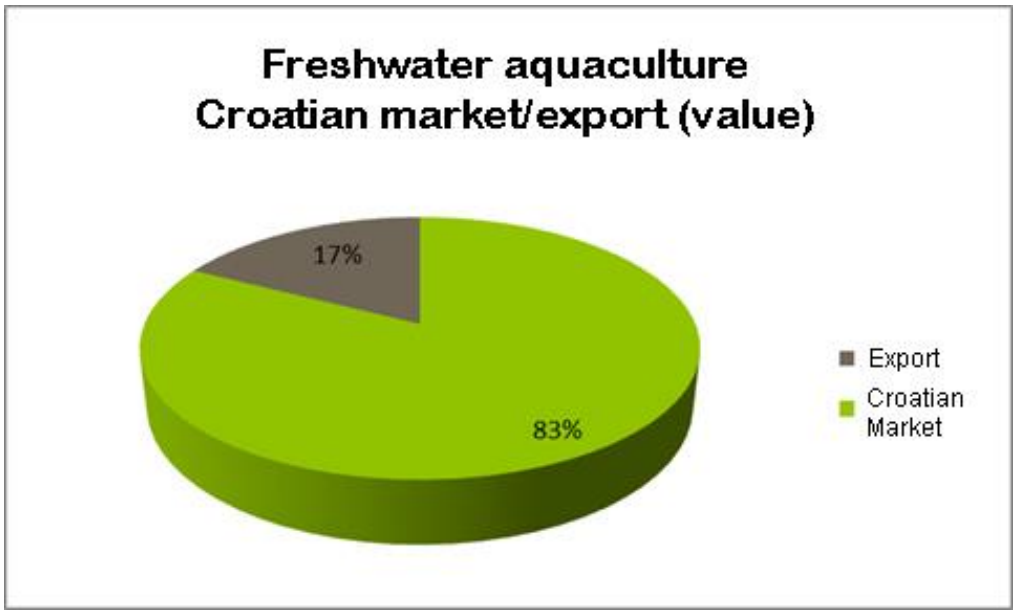
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Source: MA

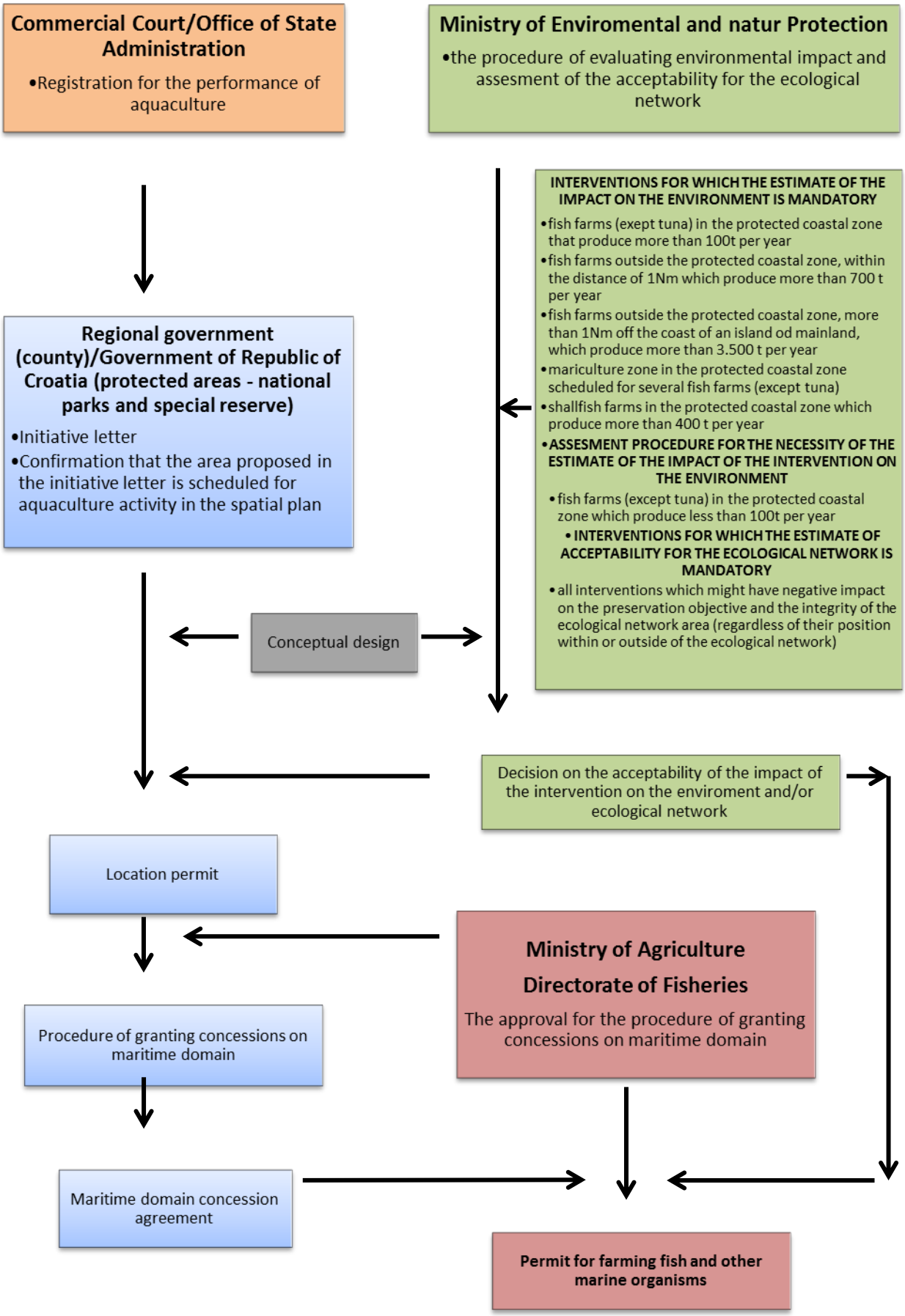


Source: MA

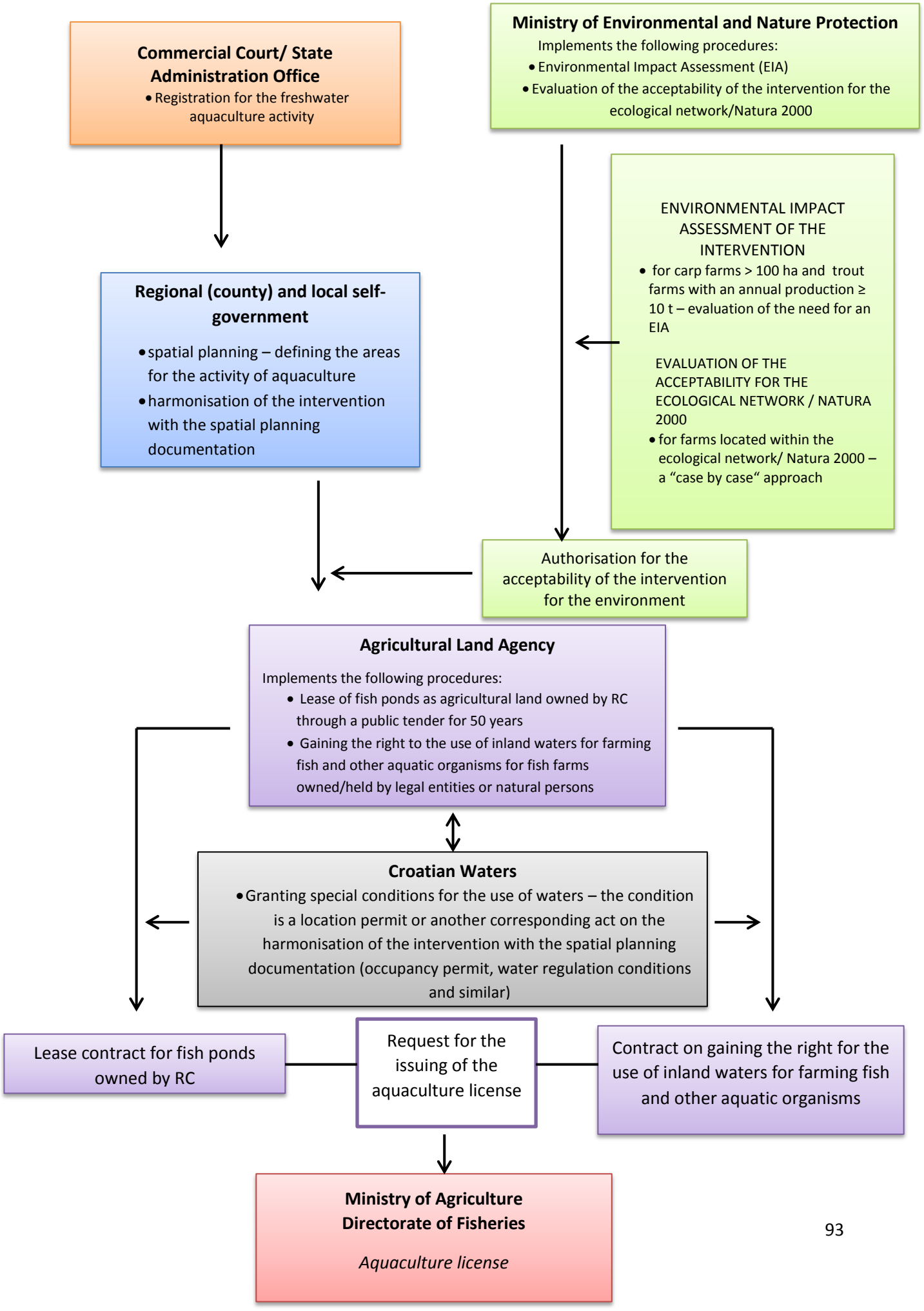


Source: MA

Appendix 2 Flowchart of the Administrative Procedure in Mariculture


Commercial Court/Office of State Administration
•Registration for the performance of aquaculture
Ministry of Enviromental and natur Protection
•the procedure of evaluating environmental impact and assesment of the acceptability for the ecological network
INTERVENTIONS FOR WHICH THE ESTIMATE OF THE IMPACT ON THE ENVIRONMENT IS MANDATORY
•fish farms (exept tuna) in the protected coastal zone that produce more than 100t per year
•fish farms outside the protected coastal zone, within the distance of 1Nm which produce more than 700 t per year
•fish farms outside the protected coastal zone, more than 1Nm off the coast of an island od mainland, which produce more than 3.500 t per year
•mariculture zone in the protected coastal zone scheduled for several fish farms (except tuna)
•shallfish farms in the protected coastal zone which produce more than 400 t per year
•ASSESMENT PROCEDURE FOR THE NECESSITY OF THE ESTIMATE OF THE IMPACT OF THE INTERVENTION ON THE ENVIRONMENT
•fish farms (except tuna) in the protected coastal zone which produce less than 100t per year
• INTERVENTIONS FOR WHICH THE ESTIMATE OF ACCEPTABILITY FOR THE ECOLOGICAL NETWORK IS MANDATORY
•all interventions which might have negative impact on the preservation objective and the integrity of the ecological network area (regardless of their position within or outside of the ecological network)
Regional government (county)/Government of Republic of Croatia (protected areas - national parks and special reserve)
•Initiative letter
•Confirmation that the area proposed in the initiative letter is scheduled for aquaculture activity in the spatial plan
Conceptual design
Decision on the acceptability of the impact of the intervention on the enviroment and/or ecological network
Location permit
Ministry of Agriculture
Directorate of Fisheries
The approval for the procedure of granting concessions on maritime domain
Procedure of granting concessions on maritime domain
Maritime domain concession agreement
Permit for farming fish and other marine organisms

Appendix 3 Flowchart of the Administrative Procedure in Freshwater Aquaculture


Commercial Court/ State Administration Office
• Registration for the freshwater aquaculture activity
Ministry of Environmental and Nature Protection
Implements the following procedures:
• Environmental Impact Assessment (EIA)
• Evaluation of the acceptability of the intervention for the ecological network/Natura 2000
ENVIRONMENTAL IMPACT ASSESSMENT OF THE INTERVENTION
• for carp farms > 100 ha and trout farms with an annual production ≥ 10 t – evaluation of the need for an EIA
EVALUATION OF THE ACCEPTABILITY FOR THE ECOLOGICAL NETWORK / NATURA 2000
• for farms located within the ecological network/ Natura 2000 – a "case by case" approach
Regional (county) and local self-government
• spatial planning – defining the areas for the activity of aquaculture
• harmonisation of the intervention with the spatial planning documentation
Authorisation for the acceptability of the intervention for the environment
Agricultural Land Agency
Implements the following procedures:
• Lease of fish ponds as agricultural land owned by RC through a public tender for 50 years
• Gaining the right to the use of inland waters for farming fish and other aquatic organisms for fish farms owned/held by legal entities or natural persons
Croatian Waters
• Granting special conditions for the use of waters – the condition is a location permit or another corresponding act on the harmonisation of the intervention with the spatial planning documentation (occupancy permit, water regulation conditions and similar)
Lease contract for fish ponds owned by RC
Request for the issuing of the aquaculture license
Contract on gaining the right for the use of inland waters for farming fish and other aquatic organisms
Ministry of Agriculture
Directorate of Fisheries
Aquaculture license

APPENDIX 4 Management and Partnership

1. **Call for information: ministries**

1. List of regulations which shall be considered during the preparation of planning documents for the development of marine and freshwater aquaculture
2. List of adopted spatial planning documents that include areas in which marine and freshwater aquaculture activities are performed
3. List of spatial planning documents which are in the process of adoption and include areas in which marine and freshwater aquaculture activities are performed
4. List of regulations that shall be considered when obtaining appropriate permits for performing marine and freshwater aquaculture activities
5. Estimate of average duration of individual processes in the application of regulations listed in item 4
6. List and amounts of fees arising from the application of processes listed in item 4 that are obligatory for marine and freshwater aquaculture activities
7. List of planned activities for the purpose of reducing the administrative load (costs and/or time) of processes in the application of regulations listed in item 4

2. **Call for information: CCE, CCTC, Mariculture Cluster**

1. List of subjects which actively perform marine and freshwater aquaculture activities
2. Data on the sales on the domestic market in marine and freshwater aquaculture for the 2003-2012 period, categorized by species and price
3. Data on export in marine and freshwater aquaculture for the 2003-2012 period, categorized by species, value and countries to which products were exported
4. Data on investments in marine and freshwater aquaculture for the 2003-2012 period
5. Data on planned investments and ongoing investments in marine and freshwater aquaculture
6. Data on the number of employees in marine and freshwater aquaculture
7. Data on realized revenue/profit in marine and freshwater aquaculture for the 2003-2012 period
8. Estimate of amounts and distribution of expenses categorized by species and types of farming
9. Data on the possibilities and priorities of the development of marine and freshwater aquaculture activities for the following periods: • until mid-2015 • until mid-2017 • until the end of 2020
10. Information and positions on the most significant administrative and other limitations for further development of marine and freshwater aquaculture
11. Information and opinions on the most significant areas for the implementation of scientific and research projects in the field of marine and freshwater aquaculture
12. Suggestions for improving the cooperation between science and industry

3. Call for information: scientific institutions

1. List of research, development and other projects in the field of marine and freshwater aquaculture realized in the 2003-2012 period, with references to any published results and papers, as well as sources of financing (private, national, international, etc.)
2. List of ongoing research, development and other projects in the field of marine and freshwater aquaculture, with references to any published results and papers, as well as sources of financing (private, national, international, etc.)
3. List of planned research, development and other projects in the field of marine and freshwater aquaculture
4. Information on the scientific curriculum for the field of marine and freshwater aquaculture that is implemented in your institution (if applicable, the title and content of the course/class, duration, educational degree which is acquired)
5. Data on the number of persons who have acquired professional qualifications in the field of marine and freshwater aquaculture in your institution (if applicable), categorized according to education degree
6. Opinion on the possibilities and limitations in the development of marine and freshwater aquaculture, as well as proposals of possible programmes for improved cooperation of science and farmers

4. Call for information: counties

1. List of all locations envisaged for marine and freshwater aquaculture activities in accordance with spatial planning documentation, with information on total area, the corresponding coordinates, types of farming, and, if applicable, the allowed farming capacity for each individual location
2. List of locations which are currently used for marine and freshwater aquaculture activities, in accordance with spatial planning documentation, including the list of authorised legal and natural persons , along with the total area, the corresponding coordinates and types of farming for each individual location
3. Digital cartographic representation with marked locations from the previous two items
4. List of adopted and planned (along with an estimate of the date of realisation) documents planning the development of marine and freshwater aquaculture activities
5. Estimate of average duration of individual processes in obtaining the appropriate permits needed for marine and freshwater aquaculture activities
6. List and amounts of fees arising from processes in obtaining the appropriate permits needed for marine and freshwater aquaculture activities
7. List of planned activities for the purpose of reducing the administrative load (costs and/or time) of processes in obtaining the appropriate permits needed for marine and freshwater aquaculture activities
8. Data on realized investments in the field of marine and freshwater aquaculture for the 2003 - 2012 period
9. Data on planned investments and ongoing investments in the field of marine and freshwater aquaculture
10. Data on income from fees that economic entities in the field of marine and freshwater aquaculture are obliged to pay in the 2003 – 2012 period, in accordance with special regulations
11. Opinion and ratings regarding the possibilities and priorities of the development of marine and freshwater aquaculture for the following periods:

• until mid-2015 • until mid-2017 • until the end of 2020
12. Opinion and ratings of the limitations of the development of marine and freshwater aquaculture

5. Workshop with administration and sector representatives, 25 – 27 September 2013

The purpose of the workshop, which included lectures by recognized EU experts, was to provide technical advice and present the NSPA contents and scope, as well as the methodology for its development and application, to the representatives of Croatian administrative bodies in charge of aquaculture development and sector representatives.

6. Workshop for all interested parties, 21 – 22 January 2014

The purpose of the workshop was to present and thoroughly discuss the first draft of the NSPA. The workshop was attended by the representatives of the state and regional administration, industry, science and education, as well as non-governmental organizations.

7. Public hearing 07 August – 05 September 2014

Public hearing enabled the participation of all interested parties and individuals in the process of NSPA development. A public presentation of the draft document was organised. Received comments and suggestions were considered and appropriately included in the NSPA.

8. Web information

During the entire process of drafting and adoption of the NSPA, all relevant information have been available to the wider public on the website of the Ministry of Agriculture:

www.mps.hr