

COMPETENCES MANUAL FOR “ENVIRONMENTAL AQUACULTURE / FISHERY”

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01 ABOUT THE TUNASIA COMPETENCE MANUAL

This Competence Manual was developed as a resource for students, teachers and employees of public and private enterprises. The Manual provides an inventory of specific competencies necessary for effective job performance in Fishery sector, which are aligned to the following project objectives to:

1. Modernize existing Bachelors-curricula towards sustainability by introducing new modularized thematic clusters in the field of environmental management, aquaculture, environmental impact analysis and production integrated environmental protection;
2. Develop a curriculum for a new transdisciplinary Masters degree programme “MSc Environmental Management of Fishery Enterprises”;
3. Implement Centers of Excellence for transdisciplinary environmental education and vocational guidance at the partner universities;
4. Develop modularized distance learning courses for the continuing education of employees in the fishery sector and adapt the new Masters degree programme for online-teaching;
5. Form networks in local and regional educational landscapes to promote and develop fishery education. To draw synergies from best practices of the universities and their transnational networks the international alignment of HE fishery education and for the continuing education of employees in the fishery sector.

01.1 PURPOSE AND SCOPE

The purpose of this Competence Manual is to define competencies as observable and measurable knowledge, skills, abilities or behavioral attributes that contribute to successful job performance for different positions and qualifications within fishery enterprises in South- East- Asia.

It is the intention that the Manual provides an understanding of the meaning, nature, and use of competencies, rubrics, and proficiency levels.

01.2 THE COMPETENCE MANUAL AND ITS ADVANTAGE TO HIGHER EDUCATION AND HUMAN RESOURCE MANAGEMENT OF FISHERY ENTERPRISES

This Competence Catalogue provides a common and immediate reference to Human Resource Management of Fishery enterprises and intends to support its following activities:

- a) Recruitment and Selection
- b) Development of Competence-based assessment tools
- c) Development of Competence-based Job Descriptions
- d) Development of a **Competence - based Performance Management System** by building a fair performance appraisal system which is (results - focused) by structuring evaluation devices around competencies
- e) **Career Development** of Employees by establishing criteria for promotion or development of a career path within the Enterprise
- f) **Learning and Development**
 - Competence -based curriculum development and design
 - Competence -based training needs assessment
- g) **Workforce Analysis and Planning** for assessing the current and future needs of the enterprises/organization based on strategic planning, goals and objectives, priority programs and projects
- h) **Succession Planning** to manage the gap that will occur when employees in key positions leave or are promoted
- i) **Reward Management** for the positive recognition of employees' work to motivate and improve their performance. This is an important factor in the recruitment and retention of high performing employees.

01.3 UNDERSTANDING OF COMPETENCIES

1. Competence Definition

According to (Parry, 1996) a Competence is defined as “a cluster of related knowledge, skills, and attitudes (KSA) that:

- affects a major part of one’s job (role or a responsibility),
- is correlated with performance on the job,
- can be measured against well-accepted standards,
- can be improved via training and development.

2. Competence KSA Framework (see Figure 1)

- **Knowledge** - understanding acquired through training.
- **Skills** - capabilities acquired through practice.
- **Attributes** - inherent characteristics, which are brought to the job.
- **Behaviour** - the observable demonstration of competence, skill, knowledge and personal attributes related to excellent performance.

3. Characteristics of Competence (see Figure 2)

- Skills and knowledge that can be learned
- Expressed in behaviours
- Drives achievement of objectives
- Building block of success
- Competence must be demonstrated and hence, must be observable.
- Competence embodies the capacity to transfer skills and abilities from one area to another

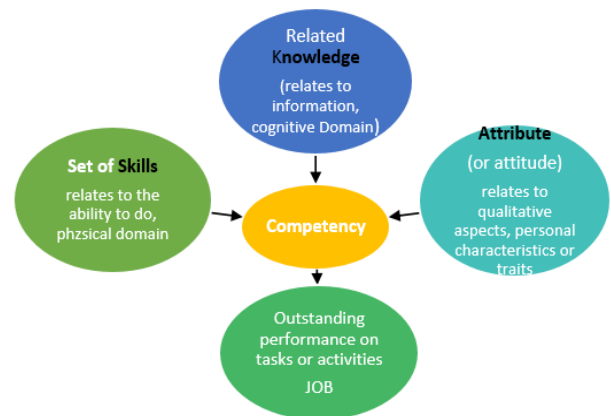


Figure 1. The KSA Framework (Parry, 1996)

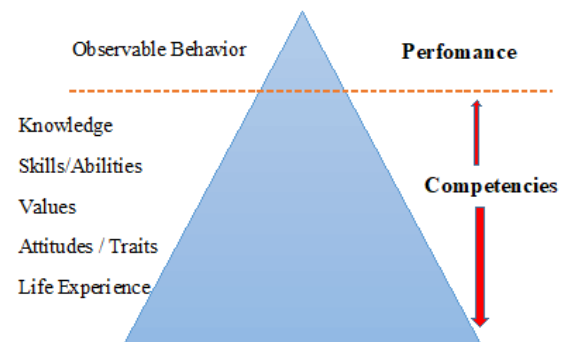


Figure 2. The Iceberg Model (adapted from MIT, 1996)

4. Benefits of Using Competencies

a) For Educational Institutions

- Facilitates the quick posting and processing of professional resumés/curriculum vitae of students and graduates at the request of employers, based on ranking by professional and personal competencies.
- The catalogue/manual of competences facilitates the development of training programs (modules, lecture courses), which take into account the knowledge and skills necessary for the successful employment of students and their career development.
- Offers the basis for providing comprehensive employment support that will help to form a competitive specialist throughout his education period.
- Preparing graduates to become aware of their own identity, their capabilities and

abilities, and their aspirations to develop and implement these more effectively.

- Develops of the willingness and ability of students to make independent decisions and judgments while enabling them to participate in a common cause and to build relationships with other participants in joint activities.

b) For the Organization

- Provides an integrated framework for designing HR systems such as recruitment and selection, learning and development, performance management, career development, workforce analysis and planning, succession planning, and rewards management (a.k.a. Competence based HR system).
- Aligns individual contributions to organizational goals since competence models are anchored on strategic directions of the organization.
- Fosters a performance-driven culture as it defines what an average job holder needs to do to attain superior performance, while it provides behavior anchored standards for recognizing exemplary performers.
- Helps in planning and budgeting HR development in a more rational and purposeful way since critical competence gaps are systematically identified and addressed.
- When developing a new position, enables organizations to “begin with the end point in mind,” i.e., defining expected outputs and outcomes from the job rather than beginning with a list of tasks and activities.
- For succession planning, facilitates the selection and placement of the best candidate or develops the right competencies of potential successors to critical positions.

c) For the Management

- Provides the foundation for sharpening their ability to select and hire best fit candidates

- Provides more objective performance standards since competencies are anchored on specifics, and measurable behaviours
- Enables managers to clearly communicate performance expectations to staff
- Minimizes subjectivity when assessing performance
- Creates a solid platform for dialogue between managers and staff on performance as well as the development and career related issues
- Guides managers in identifying staff development initiatives in a more purposeful and effective manner
- Provides the foundation for sharpening their ability to select and hire best fit candidates

d) For the Employees

- Clarifies success factors in their current roles enabling them to give of their best on the job
- Facilitates career planning, by providing information on what it takes to move to their targeted positions whether this is a lateral transfer or promotion
- Empowers staff to proactively seek competence development activities (i.e., instead of just relying on the sponsorship of their managers or the organization)

01.4 COMPETENCE MODEL / FRAMEWORK

Competence models represent the most critical knowledge, skills, and behaviours that drive successful performance. They are described in behavioural terms, using behavioural indicators so that the competencies are recognized when demonstrated.

Elements of a Competence Model

A typical competence model has the following elements:

a) **Competence Skill/Name.** The name or title indicates the general competence being described.

TUNASIA competence skills:

- foreign language skills
- managerial and organizational skills
- computer skills
- cognitive skills
- personal qualities and abilities
- physical qualities and abilities
- social and communication skills
- vocational skills and competences (aquaculture/fishery)
- vocational skills and competences (environmental management)
- transversal and key skills and competence (aquaculture/fishery)
- transversal and key skills and competence (environmental management)

b) **Competence Definition.** This is a brief description of the competence, which provides the reader a broad understanding of the type of behaviour expected from this Competence.

TUNASIA competence definition:

Example 1:

Competence in a specific field: foreign language skills

Definition: can communicate in foreign language

Example 2:

Competence field: vocational skills and competences (environmental management)

Definition: has ability to understand, state and critically analyze basic information in the field of ecology and environmental management systems

Key Point: *The more specific the definition, the clearer the Competence is communicated to all users.*

c) **Proficiency Levels** – serve several purposes. They facilitate a comparison of jobs

and roles in terms of competence requirements and the proficiency levels needed using a common incremental scale. For example, oral communication skills may be a requirement for most entry-level jobs as well as for executive levels. However, the degree of oral communication proficiency needed at these two levels may be quite different. This information is a necessary input to the selection, hiring and placement system.

02COMPETENCE CATALOGUE

02.1 Introduction

The TUNASIA Project Team established a basic Competence Manual that compiles a list of competencies, into a single document, that are needed for sustainable aquaculture in South East Asia.

a) The Competence Manual presents the general competence fields and within these fields the specific competencies that apply to jobs in the fishery and aquaculture sector. This catalogue was distributed to lecturers at HE institutions and HR personnel of fishery/aquaculture enterprises in order for them to rank each competence in respect of their required proficiency levels.

b) Purpose. To sharpen educational profiles at HE institutions towards sustainability, to define ongoing education programmes based on gap analysis and to enhance Human Resource Management systems within the following areas:

- Recruitment and Selection
- Learning and Development
- Performance Management System

c) The Competence Manual includes the competencies required for positions and their job roles.

These competencies are categorized as follows:

1. *Foreign language skills*

Possession of a system of information about the language being studied by its levels: phoneme, morpheme, lexical, syntactic. A person has language competence if s/he has an understanding of the system of the language being studied and can use this system in practice.

2. *Managerial and organizational skills*

This is a set of skills that allow people to structure their thoughts, time, and tasks. This includes the ability to manage structures, information flows, and groups of people.

3. *Computer skills*

This competence includes confident and critical use of information technologies for work, leisure and communication. This competence is supported by basic skills: using a computer for recovery, evaluation, storage, production, presentation and exchange of information, for communication and participation in collaborating networks via the Internet.

4. *Cognitive skills*

This is the ability (and readiness) to carry out various types of cognitive activity and solve various every day and professional problems on the basis of self-development, assessment of their knowledge base and opportunities for their application.

5. *Personal qualities and abilities*

These are the internal resources of the employee, which were formed under the influence of his character and personal qualities, as well as other psychological attitudes that each person carries to the external environment.

Personal competencies are the most direct way to help employees successfully complete tasks. Moreover, such personal competencies as a person's aptitude for learning, rapid assimilation of information, flexibility, etc., often when looking for a job, can successfully replace the lack of experience, and certain knowledge and skills.

6. *Physical qualities and abilities*

This is a complex of morphological and psychological properties of a person that meet the requirements of any type of muscular activity and ensure the effectiveness of their performance.

7. *Social and communication skills*

This is a set of knowledge, skills and abilities in the field of verbal and non-verbal reasoning that provide the means for adequate perception and reflection of reality in various communication situations.

8. *Vocational skills and competences (aquaculture/fishery)*

The ability to effectively apply the use of knowledge of ichthyology, aquaculture and fish farming for professional activities. These abilities require the possession of knowledge and skills in the fields of fish biology, fish breeding and fishing techniques, along with the ability to select and regulate environmental conditions in artificial conditions for the cultivation of commercial fish/invertebrate species.

9. *Vocational skills and competences (environmental management)*

Ability to apply methods of theoretical and experimental research, use modern information technologies and methods of mathematical statistics to process information and analyse the results of research activities.

10. *Transversal and key skills and competence (aquaculture/fishery)*

The ability to plan your professional and production activities. The ability to realize the effective use of materials and equipment. The ability to use the basic laws of natural sciences in professional activities, and to apply the methods of theoretical and experimental research. The ability to document observations of experimental and industrial work of field fisheries.

11. *Transversal and key skills and competence (environmental management)*

Possession of basic knowledge that is necessary for the subsequent study of general professional disciplines. Knowledge of the

main regulatory documents used in the field of ecology, nature management and environmental management. Knowledge of the basic principles of environmental design, including an understanding of the various calculation methods.

The categories and subcategories of competencies, described above, are presented in Table 1. In order to describe the quality of actions of an unskilled / qualified employee, of students (bachelor, masters and postgraduate), these were initially set reference values in order to compare the qualities. To this end, a competency development scale was developed.

We have identified **5 levels** for the compiled competencies:

Points	Teachers	Employers
1- No demand (purple)		
2- Low demand (green)		
3- Average demand (yellow)		
4- Fairly high demand (orange)		
5- High demand (red)		

The scale of development of the competencies is represented in the form of a bad to good "thermometer". The employee is evaluated in accordance with this "thermometer".

Table 1 presents an example of a survey of 10 employees of the University of NLU. The resulting numbers vary from 10 to 50, where the values : 10 - 14 are the minimum indicators, which means these competencies do not have demand, while values from 45 to 50 have a very high demand.

Table 1 – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
Foreign language skills	can understand	12	25	33	42	48
	can present	10	19	32	42	48
	can write	10	19	31	40	48
	can communicate	12	21	31	42	48
	can communicate on scientific topics	10	18	25	39	46
Managerial and organizational skills	has the ability to work in a team	27	31	38	43	45
	has the ability to organize work in a team	15	17	27	40	47
	is able to organize their own work	16	27	35	41	50
	is able to organize an employees work	14	18	28	41	45
	has the ability to motivate	19	19	31	38	42
	can set targets	16	22	32	41	50
	has supervision skills	13	19	27	38	49
	has time management skills	17	23	30	44	47
Computer skills	has basic internet knowledge	21	28	39	49	48
	has a grasp of the basic knowledge of computer programs	13	21	32	38	43
	has knowledge of specific software applications	11	17	29	36	39
	has knowledge of specialized computer programs in the field of fisheries, aquaculture, ecology and so on	10	15	29	39	46
Cognitive skills	has intellectual curiosity	19	25	35	42	46
	has the willingness to learn	21	31	39	46	48
	has analytical thinking	14	24	34	43	46
	can apply professional techniques	18	25	34	42	49
	has technical understanding	19	30	36	42	46
	has an understanding of working environments	23	27	35	40	43
Personal qualities and abilities	has quick-wittedness	24	27	32	36	34
	has safety awareness	34	37	39	42	41
	has a sense of responsibility	32	39	42	47	46
	has tenacity	31	32	34	39	40
	has tolerance of a monotonous activity	32	35	31	33	36
	is ready to accept personal responsibility	30	32	36	43	47

Table 1 (continued) – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
Personal qualities and abilities	is ready to work nights and weekends	34	35	36	39	43
	is ready to work outside	26	31	38	42	44
	has no allergies	30	28	24	24	24
	has general physical fitness	35	36	30	31	31
	has physical strength	36	34	29	28	28
	has stamina	34	35	32	32	32
	has tolerance of heat	33	30	26	24	24
	has tolerance of noise	32	31	27	25	25
	has tolerance of odours	28	27	26	24	24
Social and communication skills	has competence in professional communication	15	21	33	39	45
	has competence in written expression	13	18	30	40	47
	has the ability to foster contacts	17	22	29	36	42
	has the ability to negotiate	12	16	25	35	43
	can participate actively in discussions	15	22	30	39	48
	can participate in meetings	19	30	35	37	48
	has the ability to teach	12	19	24	37	49
Vocational skills and competences (aquaculture/ fishery)	has basic knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring	22	28	38	41	44
	has professional knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring	16	25	34	40	46
	has a readiness for organizational and managerial work with small teams	12	25	32	43	49
	is willing to lead a team in the field of their professional activity	13	23	34	45	50
	can use basic materials and equipment	27	35	36	43	47
	can use special materials and equipment	14	29	32	40	45
	can make decisions on when and where to use material and equipment	17	29	34	42	47

Table 1 (continued) – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
Vocational skills and competences (aquaculture/ fishery)	has an ability to keep documentation of field fisheries observations	13	24	35	42	45
	has an ability to keep documentation of experimental and production work	16	25	35	45	49
	can perform book-keeping activities	13	21	33	42	45
	can apply theoretical and experimental research methods in a team	10	19	30	43	47
	is able to undertake a self-study of new research methods	10	16	29	42	47
	has the skills to apply the methodology of theoretical and experimental research in the field of fisheries	10	16	31	40	45
	has knowledge of the culture of scientific research in the field of fisheries, including using the latest information and communication technologies	12	15	28	37	43
	has the ability to plan, implement and evaluate research	10	14	27	41	47
	is able to organize and evaluate the work of the research fisheries team	10	16	27	39	48
	is able to teach the main educational programs of higher education	10	15	23	37	47
Vocational skills and competences (environmental management)	has knowledge about the methods for assessing the appropriateness of the material and statistical methods for comparing the data obtained	10	13	29	39	45
	can organize research and development	10	14	26	40	47
	has the ability to undertake independent research work	10	16	25	42	49

Table 1 (continued) – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
Vocational skills and competences (environmental management)	has the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies	10	14	26	39	48
	is ready for teaching activities in the main educational programs of higher education	10	14	23	36	50
	has a basic knowledge in mathematics, physics, chemistry and biology	11	16	38	44	48
	has professionally profiled knowledge and practical skills in geology, geography, general soil science	10	14	28	36	41
	has basic general professional (general environmental) ideas about the theoretical foundations of general ecology, geoecology, human ecology, social ecology, environmental protection	10	14	30	38	43
	has knowledge of the fundamentals of the doctrine of the atmosphere, hydrosphere, biosphere and landscape ecology	10	13	24	33	38
	has knowledge of the basics of nature management, environmental economics, sustainable development, environmental impact assessment, legal fundamentals of nature management and environmental protection	10	13	26	34	36
	has the ability to understand, state and critically analyze basic information in the field of ecology and nature management	12	16	27	40	44

Table 1 (continued) – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
	has knowledge of the theoretical foundations of environmental monitoring, the regulation and reduction of environmental pollution, industrial systems and environmental risk	10	15	27	39	44
	is able to formulate problems, tasks and methods of scientific research	10	15	26	38	50
Transversal and key skills and competence (aquaculture/ fishery)	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs	13	16	26	39	43
	can organize an assessment of the fishery value and ecological status of natural and artificial reservoirs	11	13	26	38	45
	has the ability to assess the status of populations of commercial fish and other aquatic organisms	10	14	25	37	41
	can develop biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules	10	14	24	37	43
	can organize fisheries surveillance activities	10	13	27	40	43
	is able to apply methods and technologies of artificial reproduction and cultivation of aquatic organisms	17	29	36	43	44
	has knowledge about the fight against infectious and invasive diseases of aquatic organisms	16	26	36	42	45
	has knowledge about operation of technical equipment in aquaculture	20	28	38	42	44
	can organize aquaculture process control	12	22	32	39	44
	can take part in research	13	20	34	44	50
	has the ability to work independently and under the supervision of a scientific adviser to collect and process biological, environmental and fisheries information	12	19	30	43	49

Table 1 (continued) – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
Transversal and key skills and competence (aquaculture/ fishery)	can take part in the development of biological substantiation of hatchery projects, spawning-growing farms	14	24	34	44	46
	has the ability to set research objectives, choose experimental methods and provide research results	10	15	31	42	50
	has the ability to plan the necessary experiment	10	18	29	42	50
	has the ability to independently plan and carry out the collection and primary processing of biological, environmental and fisheries information	10	16	28	41	45
	can perform professionally, and draw up and report on the results of scientific work	10	14	31	43	49
	has the ability to ensure the rational use, protection and management of aquatic biological resources	10	18	27	39	44
	is able professional operation of modern equipment and instruments	11	21	33	41	43
	can organize personnel to ensure the management of technological processes in aquaculture	10	18	32	39	44
	has knowledge about economic analysis in the organization and planning of enterprises	10	14	26	39	42
	is able to work with personnel on assessment of quality and productivity	12	20	33	40	47
	can develop and optimize technological processes in aquaculture	10	14	26	38	45
	is able to teaching biological disciplines	10	14	27	38	46
	has ability to methodically competently build a lecture plan	10	14	26	38	44

Table 1 (continued) – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
Transversal and key skills and competences (environmental management)	has possession of the basics of design activities	10	14	26	38	43
	has possession of expert knowledge and analytical activities and research using modern approaches and methods	10	13	22	35	44
	can develop practical recommendations for nature conservation and sustainable development	10	15	23	36	49
	has knowledge of regulatory documents and laws	11	16	32	39	47
	can conduct environmental review and audit	10	12	22	36	44
	can research and can doing scientific-production work	10	13	28	40	50
	can lead and organize of research and scientific-production work	10	13	23	40	48
	has possession of theoretical and practical knowledge for pedagogical work	10	12	22	36	45
	can develop and apply of environmental management and environmental protection technologies	10	14	25	35	47
	has possession of methods of sampling	12	17	26	39	47
	can conduct chemical-analytical analysis of harmful emissions into the environment	10	15	29	40	44
	has skills in operation of treatment plants, treatment facilities and landfills	10	15	27	37	44
	can predict man-made disasters and their consequences	10	13	23	34	42
	can implement of technological processes for the processing, utilization and disposal of solid and liquid wastes	13	21	35	41	47
	has knowledge of the legal foundations of environmental management and environmental protection	13	18	29	38	44

Table 1 (continued) – the final results of completed questionnaires 'from university staff or employers (an example of NLU University).

Competencies		Unskilled worker	Skilled worker	Bachelor	Master	PhD
Transversal and key skills and competences (environmental management)	has a theoretical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit	10	13	28	35	41
	has practical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit	10	14	29	38	44
	has knowledge of the methods for preparing documentation for an environmental review of various types of project analysis	10	14	27	36	46
	has the ability to carrying out environmental engineering studies to assess the environmental impact of various types of economic activity	10	14	25	40	48
	has environmental policy skills for enterprises	10	13	24	37	47
	has the ability to present and critically analyze basic information in the field of ecology and nature management	10	14	25	37	48
	can undertake laboratory research under the supervision of specialists	10	21	34	43	44
	can correctly use laboratory equipment	12	23	37	44	48
	has the ability to efficiently use of laboratory equipment	13	27	36	43	47

02.2 TUNASIA Competence Table – RESULTS

Table 2 – results of a survey of university staff and employers on the competencies necessary for an unskilled worker

Competencies		Teachers	Employers
Foreign language skills	can understand		
	can present		
	can write		
	can communicate		
	can communicate on scientific topics		
Managerial and organizational skills	has the ability to work in a team		
	has the ability to organize work in a team		
	is able to organize their own work		
	is able to organize an employees work		
	has the ability to motivate		
	can set targets		
	has supervision skills		
	has time management skills		
Computer skills	has basic internet knowledge		
	has a grasp of basic knowledge of computer programs		
	has knowledge of specific software applications		
	has knowledge of specialized computer programs in the field of fisheries, aquaculture, ecology etc.		
Cognitive skills	has intellectual curiosity		
	has a willingness to learn		
	has analytical thinking skills		
	can apply professional techniques		
	has technical understanding		
	has understanding of working environments		
Personal qualities and abilities	has quick-wittedness		
	has safety awareness		
	has a sense of responsibility		
	has tenacity		
	has tolerance of monotonous activity		
	is ready to accept personal responsibility		
	is ready to work nights and weekends		
	is ready to work outside		
Physical qualities and abilities	has no allergies		
	has general physical fitness		
	has physical strength		
	has stamina		
	has a tolerance of heat		
	has a tolerance of noise		
	has a tolerance of odours		
Social and communication skills	has competence in professional communication		
	has competence in written expression		
	has an ability to foster contacts		

Table 2 (Continued) - results of a survey of university staff and employers on the competencies necessary for an unskilled worker

Competencies		Teachers	Employers
	has the ability to negotiate		
	can participate actively in discussions		
	can participate in meetings		
	has teaching ability		
Vocational skills and competences (aquaculture/ fishery)	has basic knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has professional knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has a readiness for organizational and managerial work with small teams		
	is willing to lead a team in the field of their professional activity		
	can use basic materials and equipment		
	can use special materials and equipment		
	can make decisions as to when and where to use material and equipment		
	has the ability to keep documentation of field fisheries observations		
	has the ability to keep documentation of experimental and production work		
	can perform book-keeping activities		
	can apply theoretical and experimental research methods in a team		
	is able to do a self-study of new research methods		
	has skills of methodologies for theoretical and experimental research in the field of fisheries/aquaculture		
	has knowledge of the culture of scientific research in the field of fisheries/aquaculture, including using the latest information and communication technologies		
	has the ability to plan, implement and evaluate research		
	is able to organize and evaluate the work of the research fisheries team		
	is able to teach in the main educational programs of higher education		
Vocational skills and competences (environmental management)	has knowledge about the methods for assessing the representativeness of material and statistical methods for comparing the data obtained		
	can organize research and development		
	has the ability to undertake independent research work		
	has the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies		
	is ready for teaching activities in the main educational programs of higher education		
	has a basic knowledge of mathematics, physics, chemistry and biology		
	has professionally profiled knowledge and practical skills in geology, geography, general soil science		
	has basic general professional (general environmental) ideas about the theoretical foundations of general ecology, geoecology, human ecology, social ecology, environmental protection		

Table 2 (Continued) - results of a survey of university staff and employers on the competencies necessary for an unskilled worker

Competencies		Teachers	Employers
	has knowledge of the fundamentals of the doctrine of the atmosphere, hydrosphere, biosphere and landscape ecology		
	has knowledge of the basics of nature management, environmental economics, sustainable development, environmental impact assessment, legal fundamentals of nature management and environmental protection		
	has the ability to understand, state and critically analyze basic information in the field of ecology and nature management		
	has knowledge of the theoretical foundations of environmental monitoring, regulation and reduction of environmental pollution, industrial systems and environmental risk		
	is able to formulate solutions for problems, tasks and methods of scientific research		
Transversal and key skills and competence (aquaculture/ fishery)	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	can organize of the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	has ability to assess the status of populations of commercial fish and other aquatic organisms		
	can develop of biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules		
	can organize fisheries surveillance activities		
	is able apply of methods and technologies of artificial reproduction and cultivation of aquatic organisms		
	has knowledge about fight against infectious and invasive diseases of aquatic organisms		
	has knowledge about operation of technical equipment in aquaculture		
	can organize aquaculture process control		
	can take part in the research		
	has ability to independently and under the supervision of a scientific adviser collect and process biological, environmental and fisheries information		
	can take part in the development of biological substantiation of hatchery projects, spawning-growing farms		
	has ability to set research objectives, choose experimental methods and provide research results		
	has ability to plan the necessary experiment		
	has ability to independently plan and carry out the collection and primary processing of biological, environmental and fisheries information		
	can professionally perform, draw up and report on the results of scientific work		
	has ability to ensure the rational use, protection and management of aquatic biological resources		
	is able professional operation of modern equipment and instruments		
	can organize of personnel to ensure the management of technological processes in aquaculture		
	has knowledge about economic analysis in the organization and planning of enterprises		
	is able to work with personnel, assessment of quality and productivity		

Table 2 (Continued) - results of a survey of university staff and employers on the competencies necessary for an unskilled worker

Competencies		Teachers	Employers
	can develop and optimize of technological processes in aquaculture		
	is able to teaching biological disciplines		
	has ability to methodically competently build a lecture plan		
Transversal and key skills and competence (environmental management)	has possession of the basics of design activities		
	has possession of the expert and analytical activities and research using modern approaches and methods		
	can develop of practical recommendations for nature conservation and sustainable development		
	has knowledge of regulatory documents and laws		
	can conduct environmental review and audit		
	can research and can doing scientific-production work		
	can lead and organize of research and scientific-production work		
	has possession of theoretical and practical knowledge for pedagogical work		
	can develop and apply of environmental management and environmental protection technologies		
	has possession of methods of sampling		
	can conduct chemical-analytical analysis of harmful emissions into the environment		
	has skills in operation of treatment plants, treatment facilities and landfills		
	can predict man-made disasters and their consequences		
	can implement of technological processes for the processing, utilization and disposal of solid and liquid wastes		
	has knowledge of the legal foundations of environmental management and environmental protection		
	has theoretical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has practical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has possession of methods for preparing documentation for environmental review of various types of project analysis		
	has ability to carrying out environmental engineering studies to assess the environmental impact of various types of economic activity		
	has environmental policy skills in enterprises		
	has ability to present and critically analyze basic information in the field of ecology and nature management		
	can doing laboratory research under the supervision of specialists		
	can proper use of laboratory equipment		
	has ability to efficient use of laboratory equipment		

Table 3 – results of a survey of university staff and employers on the competencies necessary for a skilled worker

Competencies		Teachers	Employers
Foreign language skills	can understand		
	can present		
	can write		
	can communicate		
	can communicate on scientific topics		
Managerial and organizational skills	has the ability to work in a team		
	has the ability to organize work in a team		
	is able to organize their own work		
	is able to organize an employees work		
	has the ability to motivate		
	can set targets		
	has supervision skills		
	has time management skills		
Computer skills	has basic internet knowledge		
	has a grasp of basic knowledge of computer programs		
	has knowledge of specific software applications		
	has knowledge of specialized computer programs in the field of fisheries, aquaculture, ecology etc.		
Cognitive skills	has intellectual curiosity		
	has a willingness to learn		
	has analytical thinking skills		
	can apply professional techniques		
	has technical understanding		
	has understanding of working environments		
Personal qualities and abilities	has quick-wittedness		
	has safety awareness		
	has a sense of responsibility		
	has tenacity		
	has tolerance of monotonous activity		
	is ready to accept personal responsibility		
	is ready to work nights and weekends		
	is ready to work outside		
Physical qualities and abilities	has no allergies		
	has general physical fitness		
	has physical strength		
	has stamina		
	has a tolerance of heat		
	has a tolerance of noise		
	has a tolerance of odours		
Social and communication skills	has competence in professional communication		
	has competence in written expression		
	has an ability to foster contacts		
	has the ability to negotiate		
	can participate actively in discussions		
	can participate in meetings		
	has teaching ability		

Table 3 (Continued) – results of a survey of university staff and employers on the competencies necessary for a skilled worker

Competencies		Teachers	Employers
Vocational skills and competences (aquaculture/fishery)	has basic knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has professional knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has a readiness for organizational and managerial work with small teams		
	is willing to lead a team in the field of their professional activity		
	can use basic materials and equipment		
	can use special materials and equipment		
	can make decisions as to when and where to use material and equipment		
	has the ability to keep documentation of field fisheries observations		
	has the ability to keep documentation of experimental and production work		
	can perform book-keeping activities		
	can apply theoretical and experimental research methods in a team		
	is able to do a self-study of new research methods		
	has skills of methodologies for theoretical and experimental research in the field of fisheries/aquaculture		
	has knowledge of the culture of scientific research in the field of fisheries/aquaculture, including using the latest information and communication technologies		
	has the ability to plan, implement and evaluate research		
	is able to organize and evaluate the work of the research fisheries team		
	is able to teach in the main educational programs of higher education		
Vocational skills and competences (environmental management)	has knowledge about the methods for assessing the representativeness of material and statistical methods for comparing the data obtained		
	can organize research and development		
	has the ability to undertake independent research work		
	has the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies		
	is ready for teaching activities in the main educational programs of higher education		
	has a basic knowledge of mathematics, physics, chemistry and biology		
	has professionally profiled knowledge and practical skills in geology, geography, general soil science		
	has basic general professional (general environmental) ideas about the theoretical foundations of general ecology, geoecology, human ecology, social ecology, environmental protection		
	has knowledge of the fundamentals of the doctrine of the atmosphere, hydrosphere, biosphere and landscape ecology		

Table 3 (Continued) – results of a survey of university staff and employers on the competencies necessary for a skilled worker

Competencies		Teachers	Employers
	has knowledge of the basics of nature management, environmental economics, sustainable development, environmental impact assessment, legal fundamentals of nature management and environmental protection		
	has the ability to understand, state and critically analyze basic information in the field of ecology and nature management		
	has knowledge of the theoretical foundations of environmental monitoring, regulation and reduction of environmental pollution, industrial systems and environmental risk		
	is able to formulate solutions for problems, tasks and methods of scientific research		
Transversal and key skills and competence (aquaculture/ fishery)	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	can organize of the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	has ability to assess the status of populations of commercial fish and other aquatic organisms		
	can develop of biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules		
	can organize fisheries surveillance activities		
	is able apply of methods and technologies of artificial reproduction and cultivation of aquatic organisms		
	has knowledge about fight against infectious and invasive diseases of aquatic organisms		
	has knowledge about operation of technical equipment in aquaculture		
	can organize aquaculture process control		
	can take part in the research		
	has ability to independently and under the supervision of a scientific adviser collect and process biological, environmental and fisheries information		
	can take part in the development of biological substantiation of hatchery projects, spawning-growing farms		
	has ability to set research objectives, choose experimental methods and provide research results		
	has ability to plan the necessary experiment		
	has ability to independently plan and carry out the collection and primary processing of biological, environmental and fisheries information		
	can professionally perform, draw up and report on the results of scientific work		
	has ability to ensure the rational use, protection and management of aquatic biological resources		
	is able professional operation of modern equipment and instruments		
	can organize of personnel to ensure the management of technological processes in aquaculture		
	has knowledge about economic analysis in the organization and planning of enterprises		
	is able to work with personnel, assessment of quality and productivity		

Table 3 (Continued) – results of a survey of university staff and employers on the competencies necessary for a skilled worker

Competencies		Teachers	Employers
	can develop and optimize of technological processes in aquaculture		
	is able to teaching biological disciplines		
	has ability to methodically competently build a lecture plan		
Transversal and key skills and competence (environmental management)	has possession of the basics of design activities		
	has possession of the expert and analytical activities and research using modern approaches and methods		
	can develop of practical recommendations for nature conservation and sustainable development		
	has knowledge of regulatory documents and laws		
	can conduct environmental review and audit		
	can research and can doing scientific-production work		
	can lead and organize of research and scientific-production work		
	has possession of theoretical and practical knowledge for pedagogical work		
	can develop and apply of environmental management and environmental protection technologies		
	has possession of methods of sampling		
	can conduct chemical-analytical analysis of harmful emissions into the environment		
	can conduct chemical-analytical analysis of harmful emissions into the environment		
	has skills in operation of treatment plants, treatment facilities and landfills		
	can predict man-made disasters and their consequences		
	can implement of technological processes for the processing, utilization and disposal of solid and liquid wastes		
	has knowledge of the legal foundations of environmental management and environmental protection		
	has theoretical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has practical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has possession of methods for preparing documentation for environmental review of various types of project analysis		
	has ability to carrying out environmental engineering studies to assess the environmental impact of various types of economic activity		
	has environmental policy skills in enterprises		
	has ability to present and critically analyze basic information in the field of ecology and nature management		
	can doing laboratory research under the supervision of specialists		
	can proper use of laboratory equipment		
	has ability to efficient use of laboratory equipment		

Table 4 – results of a survey of university staff and employers on the competencies necessary for a bachelors graduate

Competencies		Teachers	Employers
Foreign language skills	can understand		
	can present		
	can write		
	can communicate		
	can communicate on scientific topics		
Managerial and organizational skills	has the ability to work in a team		
	has the ability to organize work in a team		
	is able to organize their own work		
	is able to organize an employees work		
	has the ability to motivate		
	can set targets		
	has supervision skills		
	has time management skills		
Computer skills	has basic internet knowledge		
	has a grasp of basic knowledge of computer programs		
	has knowledge of specific software applications		
	has knowledge of specialized computer programs in the field of fisheries, aquaculture, ecology etc.		
Cognitive skills	has intellectual curiosity		
	has a willingness to learn		
	has analytical thinking skills		
	can apply professional techniques		
	has technical understanding		
	has understanding of working environments		
Personal qualities and abilities	has quick-wittedness		
	has safety awareness		
	has a sense of responsibility		
	has tenacity		
	has tolerance of monotonous activity		
	is ready to accept personal responsibility		
	is ready to work nights and weekends		
	is ready to work outside		
Physical qualities and abilities	has no allergies		
	has general physical fitness		
	has physical strength		
	has stamina		
	has a tolerance of heat		
	has a tolerance of noise		
	has a tolerance of odours		
Social and communication skills	has competence in professional communication		
	has competence in written expression		
	has an ability to foster contacts		
	has the ability to negotiate		
	can participate actively in discussions		
	can participate in meetings		
	has teaching ability		

Table 4 (Continued) – results of a survey of university staff and employers on the competencies necessary for a bachelors graduate

Competencies		Teachers	Employers
Vocational skills and competences (aquaculture/ fishery)	has basic knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has professional knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has a readiness for organizational and managerial work with small teams		
	is willing to lead a team in the field of their professional activity		
	can use basic materials and equipment		
	can use special materials and equipment		
	can make decisions as to when and where to use material and equipment		
	has the ability to keep documentation of field fisheries observations		
	has the ability to keep documentation of experimental and production work		
	can perform book-keeping activities		
	can apply theoretical and experimental research methods in a team		
	is able to do a self-study of new research methods		
	has skills of methodologies for theoretical and experimental research in the field of fisheries/aquaculture		
	has knowledge of the culture of scientific research in the field of fisheries/aquaculture, including using the latest information and communication technologies		
	has the ability to plan, implement and evaluate research		
	is able to organize and evaluate the work of the research fisheries team		
	is able to teach in the main educational programs of higher education		
Vocational skills and competences (environmental management)	has knowledge about the methods for assessing the representativeness of material and statistical methods for comparing the data obtained		
	can organize research and development		
	has the ability to undertake independent research work		
	has the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies		
	is ready for teaching activities in the main educational programs of higher education		
	has a basic knowledge of mathematics, physics, chemistry and biology		
	has professionally profiled knowledge and practical skills in geology, geography, general soil science		
	has basic general professional (general environmental) ideas about the theoretical foundations of general ecology, geoecology, human ecology, social ecology, environmental protection		
	has knowledge of the fundamentals of the doctrine of the atmosphere, hydrosphere, biosphere and landscape ecology		

Table 4 (Continued) - – results of a survey of university staff and employers on the competencies necessary for a bachelors graduate

Competencies		Teachers	Employers
	has knowledge of the basics of nature management, environmental economics, sustainable development, environmental impact assessment, legal fundamentals of nature management and environmental protection		
	has the ability to understand, state and critically analyze basic information in the field of ecology and nature management		
	has knowledge of the theoretical foundations of environmental monitoring, regulation and reduction of environmental pollution, industrial systems and environmental risk		
	is able to formulate solutions for problems, tasks and methods of scientific research		
Transversal and key skills and competence (aquaculture/ fishery)	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	can organize of the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	has ability to assess the status of populations of commercial fish and other aquatic organisms		
	can develop of biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules		
	can organize fisheries surveillance activities		
	is able apply of methods and technologies of artificial reproduction and cultivation of aquatic organisms		
	has knowledge about fight against infectious and invasive diseases of aquatic organisms		
	has knowledge about operation of technical equipment in aquaculture		
	can organize aquaculture process control		
	can take part in the research		
	has ability to independently and under the supervision of a scientific adviser collect and process biological, environmental and fisheries information		
	can take part in the development of biological substantiation of hatchery projects, spawning-growing farms		
	has ability to set research objectives, choose experimental methods and provide research results		
	has ability to plan the necessary experiment		
	has ability to independently plan and carry out the collection and primary processing of biological, environmental and fisheries information		
	can professionally perform, draw up and report on the results of scientific work		
	has ability to ensure the rational use, protection and management of aquatic biological resources		
	is able professional operation of modern equipment and instruments		
	can organize of personnel to ensure the management of technological processes in aquaculture		
	has knowledge about economic analysis in the organization and planning of enterprises		
	is able to work with personnel, assessment of quality and productivity		

Table 4 (Continued) – results of a survey of university staff and employers on the competencies necessary for a bachelors graduate

Competencies		Teachers	Employers
	can develop and optimize of technological processes in aquaculture		
	is able to teaching biological disciplines		
	has ability to methodically competently build a lecture plan		
Transversal and key skills and competence (environmental management)	has possession of the basics of design activities		
	has possession of the expert and analytical activities and research using modern approaches and methods		
	can develop of practical recommendations for nature conservation and sustainable development		
	has knowledge of regulatory documents and laws		
	can conduct environmental review and audit		
	can research and can doing scientific-production work		
	can lead and organize of research and scientific-production work		
	has possession of theoretical and practical knowledge for pedagogical work		
	can develop and apply of environmental management and environmental protection technologies		
	has possession of methods of sampling		
	can conduct chemical-analytical analysis of harmful emissions into the environment		
	can conduct chemical-analytical analysis of harmful emissions into the environment		
	has skills in operation of treatment plants, treatment facilities and landfills		
	can implement of technological processes for the processing, utilization and disposal of solid and liquid wastes		
	has knowledge of the legal foundations of environmental management and environmental protection		
	has theoretical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has practical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has possession of methods for preparing documentation for environmental review of various types of project analysis		
	has ability to carrying out environmental engineering studies to assess the environmental impact of various types of economic activity		
	has environmental policy skills in enterprises		
	has ability to present and critically analyze basic information in the field of ecology and nature management		
	can doing laboratory research under the supervision of specialists		
	can proper use of laboratory equipment		
	has ability to efficient use of laboratory equipment		

Table 5 – results of a survey of university staff and employers on the competencies necessary for a master

Competencies		Teachers	Employers
Foreign language skills	can understand		
	can present		
	can write		
	can communicate		
	can communicate on scientific topics		
Managerial and organizational skills	has the ability to work in a team		
	has the ability to organize work in a team		
	has the ability to work in a team		
	has the ability to organize work in a team		
	is able to organize their own work		
	is able to organize an employee's work		
	has the ability to motivate		
	has time management skills		
Computer skills	has basic internet knowledge		
	has a grasp of basic knowledge of computer programs		
	has knowledge of specific software applications		
	has knowledge of specialized computer programs in the field of fisheries, aquaculture, ecology etc.		
Cognitive skills	has intellectual curiosity		
	has a willingness to learn		
	has analytical thinking skills		
	can apply professional techniques		
	has technical understanding		
	has understanding of working environments		
Personal qualities and abilities	has quick-wittedness		
	has safety awareness		
	has a sense of responsibility		
	has tenacity		
	has tolerance of monotonous activity		
	is ready to accept personal responsibility		
	is ready to work nights and weekends		
	is ready to work outside		
Physical qualities and abilities	has no allergies		
	has general physical fitness		
	has physical strength		
	has stamina		
	has a tolerance of heat		
	has a tolerance of noise		
	has a tolerance of odours		
Social and communication skills	has competence in professional communication		
	has competence in written expression		
	has an ability to foster contacts		
	has the ability to negotiate		
	can participate actively in discussions		
	can participate in meetings		

Table 5 (Continued) – results of a survey of university staff and employers on the competencies necessary for a master

Competencies		Teachers	Employers
	has teaching ability		
Vocational skills and competences (aquaculture/ fishery)	has basic knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has professional knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has a readiness for organizational and managerial work with small teams		
	is willing to lead a team in the field of their professional activity		
	can use basic materials and equipment		
	can use special materials and equipment		
	can make decisions as to when and where to use material and equipment		
	has the ability to keep documentation of field fisheries observations		
	has the ability to keep documentation of experimental and production work		
	can perform book-keeping activities		
	can apply theoretical and experimental research methods in a team		
	is able to do a self-study of new research methods		
	has skills of methodologies for theoretical and experimental research in the field of fisheries/aquaculture		
	has knowledge of the culture of scientific research in the field of fisheries/aquaculture, including using the latest information and communication technologies		
	has the ability to plan, implement and evaluate research		
	is able to organize and evaluate the work of the research fisheries team		
	is able to teach in the main educational programs of higher education		
Vocational skills and competences (environmental management)	has knowledge about the methods for assessing the representativeness of material and statistical methods for comparing the data obtained		
	can organize research and development		
	has the ability to undertake independent research work		
	has the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies		
	is ready for teaching activities in the main educational programs of higher education		
	has a basic knowledge of mathematics, physics, chemistry and biology		
	has professionally profiled knowledge and practical skills in geology, geography, general soil science		
	has basic general professional (general environmental) ideas about the theoretical foundations of general ecology, geoecology, human ecology, social ecology, environmental protection		
	has knowledge of the fundamentals of the doctrine of the atmosphere, hydrosphere, biosphere and landscape ecology		
	has knowledge of the basics of nature management, environmental economics, sustainable development, environmental impact assessment, legal fundamentals of nature management and environmental protection		

Table 5 (Continued) – results of a survey of university staff and employers on the competencies necessary for a master

Competencies		Teachers	Employers
	has the ability to understand, state and critically analyze basic information in the field of ecology and nature management		
	has knowledge of the theoretical foundations of environmental monitoring, regulation and reduction of environmental pollution, industrial systems and environmental risk		
	is able to formulate solutions for problems, tasks and methods of scientific research		
Transversal and key skills and competence (aquaculture/fishery)	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	can organize of the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	has ability to assess the status of populations of commercial fish and other aquatic organisms		
	can develop of biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules		
	can organize fisheries surveillance activities		
	is able apply of methods and technologies of artificial reproduction and cultivation of aquatic organisms		
	has knowledge about fight against infectious and invasive diseases of aquatic organisms		
	has knowledge about operation of technical equipment in aquaculture		
	can organize aquaculture process control		
	can take part in the research		
	has ability to independently and under the supervision of a scientific adviser collect and process biological, environmental and fisheries information		
	can take part in the development of biological substantiation of hatchery projects, spawning-growing farms		
	has ability to set research objectives, choose experimental methods and provide research results		
	has ability to plan the necessary experiment		
	has ability to independently plan and carry out the collection and primary processing of biological, environmental and fisheries information		
	can professionally perform, draw up and report on the results of scientific work		
	has ability to ensure the rational use, protection and management of aquatic biological resources		
	is able professional operation of modern equipment and instruments		
	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	can organize of the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	has ability to assess the status of populations of commercial fish and other aquatic organisms		
	can develop of biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules		
	can organize fisheries surveillance activities		
	is able apply of methods and technologies of artificial reproduction and cultivation of aquatic organisms		

Table 5 (Continued) – results of a survey of university staff and employers on the competencies necessary for a master

Competencies		Teachers	Employers
Transversal and key skills and competence (environmental management)	has possession of the basics of design activities		
	has possession of the expert and analytical activities and research using modern approaches and methods		
	can develop of practical recommendations for nature conservation and sustainable development		
	has knowledge of regulatory documents and laws		
	can conduct environmental review and audit		
	can research and can doing scientific-production work		
	can lead and organize of research and scientific-production work		
	has possession of theoretical and practical knowledge for pedagogical work		
	can develop and apply of environmental management and environmental protection technologies		
	has possession of methods of sampling		
	can conduct chemical-analytical analysis of harmful emissions into the environment		
	has skills in operation of treatment plants, treatment facilities and landfills		
	can predict man-made disasters and their consequences		
	can implement of technological processes for the processing, utilization and disposal of solid and liquid wastes		
	has knowledge of the legal foundations of environmental management and environmental protection		
	has theoretical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has practical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has possession of methods for preparing documentation for environmental review of various types of project analysis		
	has ability to carrying out environmental engineering studies to assess the environmental impact of various types of economic activity		
	has environmental policy skills in enterprises		
	has ability to present and critically analyze basic information in the field of ecology and nature management		
	can doing laboratory research under the supervision of specialists		
	can proper use of laboratory equipment		
	has ability to efficient use of laboratory equipment		

Table 6 – results of a survey of university staff and employers on the competencies necessary for a PhD student

Competencies		Teachers	Employers
Foreign language skills	can understand		
	can present		
	can write		
	can communicate		
	can communicate on scientific topics		
Managerial and organizational skills	has the ability to work in a team		
	has the ability to organize work in a team		
	is able to organize their own work		
	is able to organize an employee's work		
	has the ability to motivate		
	can set targets		
	has supervision skills		
	has time management skills		
Computer skills	has basic internet knowledge		
	has a grasp of basic knowledge of computer programs		
	has knowledge of specific software applications		
	has knowledge of specialized computer programs in the field of fisheries, aquaculture, ecology etc.		
Cognitive skills	has intellectual curiosity		
	has a willingness to learn		
	has analytical thinking skills		
	can apply professional techniques		
	has technical understanding		
	has understanding of working environments		
Personal qualities and abilities	has quick-wittedness		
	has safety awareness		
	has a sense of responsibility		
	has tenacity		
	has tolerance of monotonous activity		
	is ready to accept personal responsibility		
	is ready to work nights and weekends		
	is ready to work outside		
Physical qualities and abilities	has no allergies		
	has general physical fitness		
	has physical strength		
	has stamina		
	has a tolerance of heat		
	has a tolerance of noise		
	has a tolerance of odours		
Social and communication skills	has competence in professional communication		
	has competence in written expression		
	has an ability to foster contacts		
	has the ability to negotiate		
	can participate actively in discussions		
	can participate in meetings		
	has teaching ability		

Table 6 (Continued) - results of a survey of university staff and employers on the competencies necessary for a PhD student

Competencies		Teachers	Employers
Vocational skills and competences (aquaculture/fishery)	has basic knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has professional knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring		
	has a readiness for organizational and managerial work with small teams		
	is willing to lead a team in the field of their professional activity		
	can use basic materials and equipment		
	can use special materials and equipment		
	can make decisions as to when and where to use material and equipment		
	has the ability to keep documentation of field fisheries observations		
	has the ability to keep documentation of experimental and production work		
	can perform book-keeping activities		
	can apply theoretical and experimental research methods in a team		
	is able to do a self-study of new research methods		
	has skills of methodologies for theoretical and experimental research in the field of fisheries/aquaculture		
	has knowledge of the culture of scientific research in the field of fisheries/aquaculture, including using the latest information and communication technologies		
	has the ability to plan, implement and evaluate research		
	is able to organize and evaluate the work of the research fisheries team		
	is able to teach in the main educational programs of higher education		
Vocational skills and competences (environmental management)	has knowledge about the methods for assessing the representativeness of material and statistical methods for comparing the data obtained		
	can organize research and development		
	has the ability to undertake independent research work		
	has the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies		
	is ready for teaching activities in the main educational programs of higher education		
	has a basic knowledge of mathematics, physics, chemistry and biology		
	has professionally profiled knowledge and practical skills in geology, geography, general soil science		
	has basic general professional (general environmental) ideas about the theoretical foundations of general ecology, geoecology, human ecology, social ecology, environmental protection		
	has knowledge of the fundamentals of the doctrine of the atmosphere, hydrosphere, biosphere and landscape ecology		
	has knowledge of the basics of nature management, environmental economics, sustainable development, environmental impact assessment, legal fundamentals of nature management and environmental protection		
	has the ability to understand, state and critically analyze basic information in the field of ecology and nature management		

Table 6 (Continued) - results of a survey of university staff and employers on the competencies necessary for a PhD student

Competencies		Teachers	Employers
	has knowledge of the theoretical foundations of environmental monitoring, regulation and reduction of environmental pollution, industrial systems and environmental risk		
	is able to formulate solutions for problems, tasks and methods of scientific research		
Transversal and key skills and competence (aquaculture/fishery)	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	can organize of the assessment of the fishery value and ecological status of natural and artificial reservoirs		
	has ability to assess the status of populations of commercial fish and other aquatic organisms		
	can develop of biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules		
	can organize fisheries surveillance activities		
	is able apply of methods and technologies of artificial reproduction and cultivation of aquatic organisms		
	has knowledge about fight against infectious and invasive diseases of aquatic organisms		
	has knowledge about operation of technical equipment in aquaculture		
	can organize aquaculture process control		
	can take part in the research		
	has ability to independently and under the supervision of a scientific adviser collect and process biological, environmental and fisheries information		
	can take part in the development of biological substantiation of hatchery projects, spawning-growing farms		
	has ability to set research objectives, choose experimental methods and provide research results		
	has ability to plan the necessary experiment		
	has ability to independently plan and carry out the collection and primary processing of biological, environmental and fisheries information		
	can professionally perform, draw up and report on the results of scientific work		
	has ability to ensure the rational use, protection and management of aquatic biological resources		
	is able professional operation of modern equipment and instruments		
	can organize of personnel to ensure the management of technological processes in aquaculture		
	has knowledge about economic analysis in the organization and planning of enterprises		
	is able to work with personnel, assessment of quality and productivity		
	can develop and optimize of technological processes in aquaculture		
	is able to teaching biological disciplines		
	has ability to methodically competently build a lecture plan		

Table 6 (Continued) - results of a survey of university staff and employers on the competencies necessary for a PhD student

Competencies		Teachers	Employers
Transversal and key skills and competence (environmental management)	has possession of the basics of design activities		
	has possession of the expert and analytical activities and research using modern approaches and methods		
	can develop of practical recommendations for nature conservation and sustainable development		
	has knowledge of regulatory documents and laws		
	can conduct environmental review and audit		
	can research and can doing scientific-production work		
	can lead and organize of research and scientific-production work		
	has possession of theoretical and practical knowledge for pedagogical work		
	can develop and apply of environmental management and environmental protection technologies		
	has possession of methods of sampling		
	can conduct chemical-analytical analysis of harmful emissions into the environment		
	has skills in operation of treatment plants, treatment facilities and landfills		
	can predict man-made disasters and their consequences		
	can implement of technological processes for the processing, utilization and disposal of solid and liquid wastes		
	has knowledge of the legal foundations of environmental management and environmental protection		
	has theoretical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has practical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit		
	has possession of methods for preparing documentation for environmental review of various types of project analysis		
	has ability to carrying out environmental engineering studies to assess the environmental impact of various types of economic activity		
	has environmental policy skills in enterprises		
	has ability to present and critically analyze basic information in the field of ecology and nature management		
	can doing laboratory research under the supervision of specialists		
	can proper use of laboratory equipment		
	has ability to efficient use of laboratory equipment		

02.3 TUNASIA Competence Table. ANALYSIS

There were 41 completed competency tables, which formed the basis for the analysis of the results of the survey, of these:

- 12 completed tables were the result of the survey of the teaching staff of the universities in Thailand:

- Khon Kaen University (KKU)
- Maejo University (MJU)

- 15 completed tables were the result of the survey of the teaching staff of the universities in Vietnam:

- Truong Dai Hoc Nong Lam - Thanh Pho Ho Chi Minh (NLU)
- Nha Trang University (NTU)
- Thai Nguyen University of Agriculture and Forestry (TUAF)

- 14 completed tables, were the result of the survey of company employers that are industrial partners of these universities.

Figure 3 shows the overall results of the survey of the teaching staff of the universities from both countries. To enhance the visual clarity of the results, the values were averaged for each university and group of competencies. That is, in this case, the scale of competencies is as follows:

6-10 - no demand

11-15 - low demand

16-20 - average demand

21-25 - fairly high demand

26-30 - high demand

For a bachelor's degree student, almost all the competencies presented were in demand on average, meaning that the specialist must have these competencies at the initial level. However, personal qualities were evaluated as quite popular, which means that this profile level is managed and not a leading one.

For the masters and post-graduate students, almost all competency groups were graded as of between high and fairly high demand.

However, the group of physical qualities, for both profiles, were graded as of low demand, from which we can conclude that this profile is initially "high-quality", compared with unskilled specialists, for which this type of physical work is based.

The next stage of the analysis was a comparison of the results from the survey of the teaching staff of both two countries. Three profiles were analysed: bachelors, masters and post-graduate student. The results were also averaged. Figures 4-6 show that the survey results have some differences. For the bachelors students, lecturers from Vietnam thought that competency groups directly related to the profession (vocational and transferable skills) should be graded as of average demand. Most likely, this is due to the fact, that the student receives more "in depth" knowledge in the subsequent stages (masters and postgraduate students). The smallest difference in results was noted in the postgraduate PhD student profile.

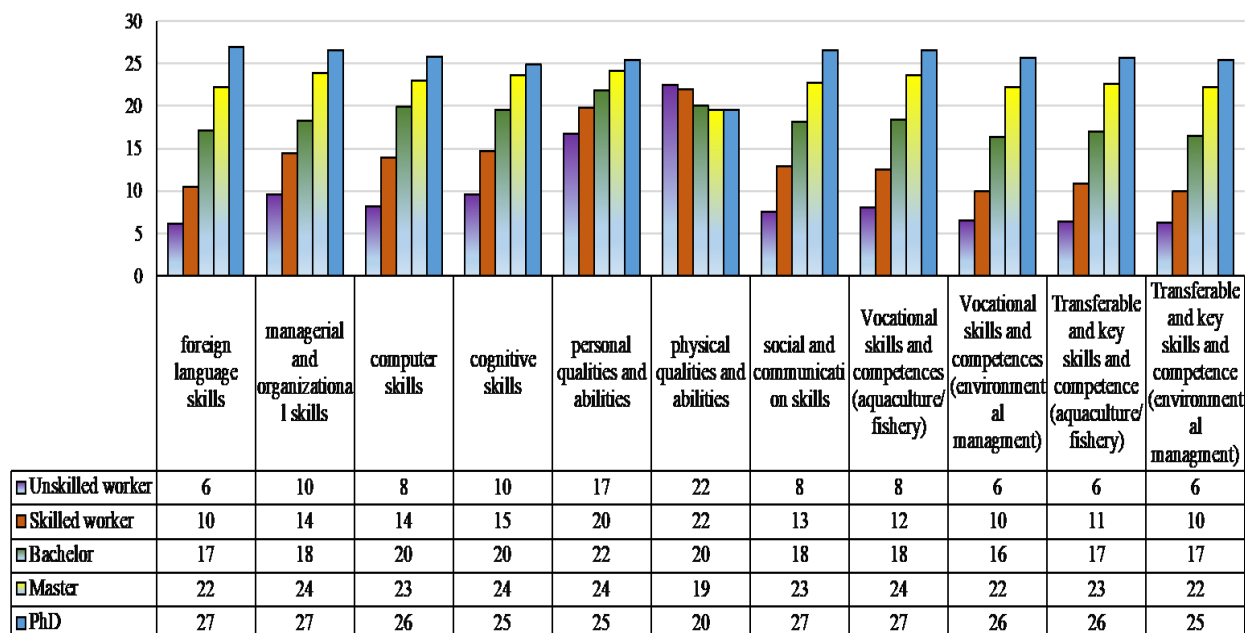


Figure 3 - Averaged survey of university staff of five universities

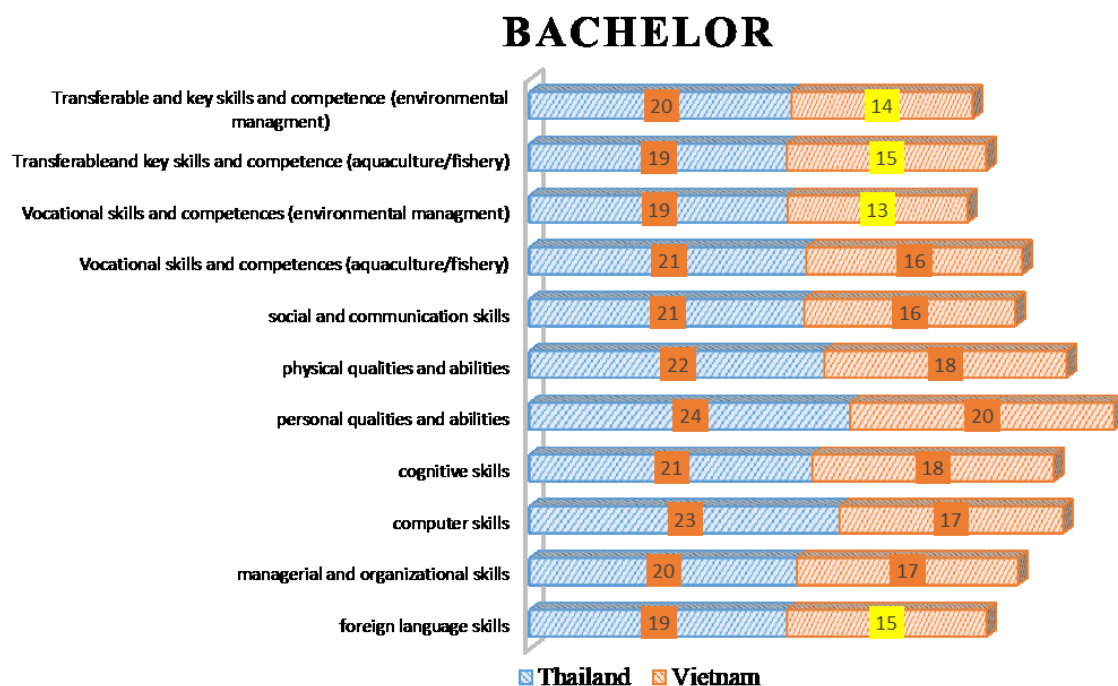


Figure 4 – Comparison by country of lecturers survey for Bachelor skills

MASTER

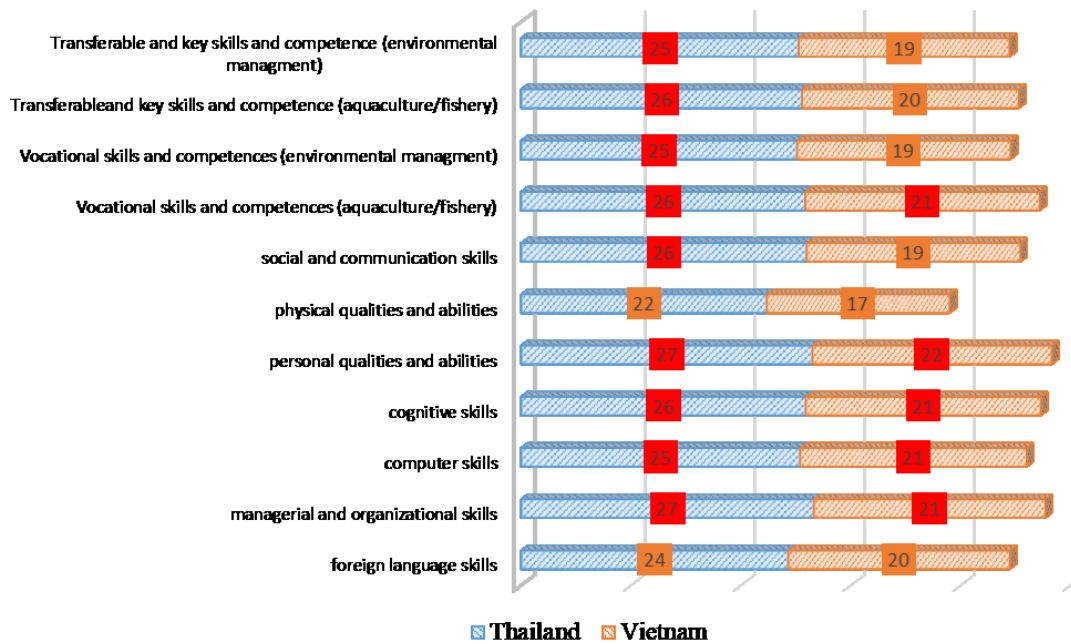


Figure 5 – Comparison by country of lecturers survey results for Master students

PHD

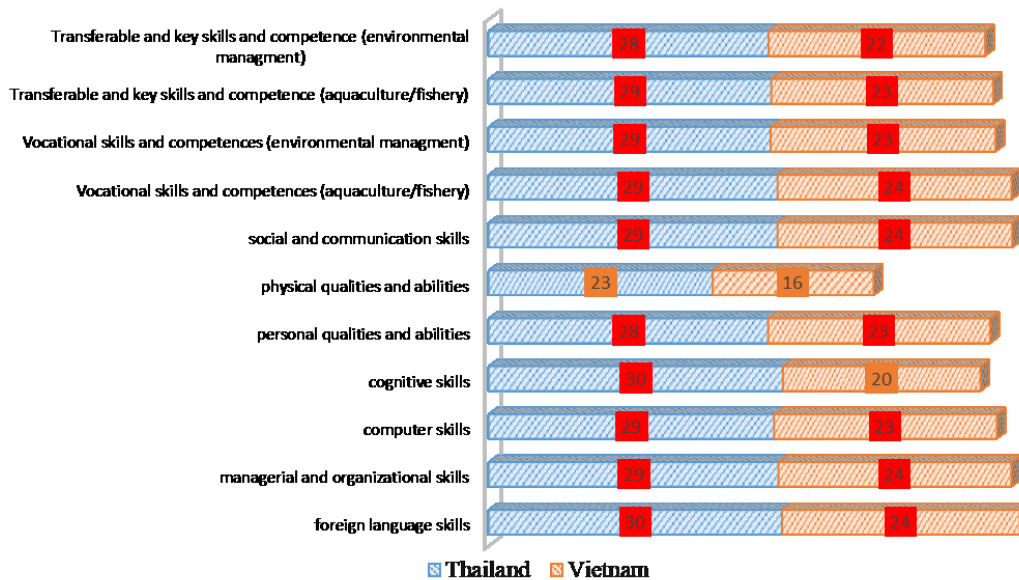


Figure 6 – Comparison by country of lecturers survey results for PhD country

The final step was to compare the results obtained from the teaching staff and employers. The data presented in Table 7 are the total results for all competency tables.

The final results show only a slight difference between the opinions of lecturers and employers. On the basis of data, we can conclude that the universities prepare students with the knowledge and skills that will be needed in the future for a successful workflow in a fisheries and/or aquaculture enterprise.

Table 7 - Comparative table for the results of a survey of teaching staff and employers (T – teachers, E – employers) for Bachelor, Masters and PhD student levels

Competence		Bachelor		Master		PhD	
		T	E	T	E	T	E
Foreign language skills	can understand						
	can present						
	can write						
	can communicate						
	can communicate on scientific topics						
Managerial and organizational skills	has the ability to work in a team						
	has the ability to organize work in a team						
	is able to organize their own work						
	is able to organize an employee's work						
	has the ability to motivate						
	can set targets						
	has supervision skills						
	has time management skills						
Computer skills	has basic internet knowledge						
	has a grasp of basic knowledge of computer programs						
	has knowledge of specific software applications						
	has knowledge of specialized computer programs in the field of fisheries, aquaculture, ecology etc.						
Cognitive skills	has intellectual curiosity						
	has a willingness to learn						
	has analytical thinking skills						
	can apply professional techniques						
	has technical understanding						
	has understanding of working environments						
Personal qualities and abilities	has quick-wittedness						
	has safety awareness						
	has a sense of responsibility						
	has tenacity						
	has tolerance of monotonous activity						
	is ready to accept personal responsibility						
	is ready to work nights and weekends						
	is ready to work outside						
Physical qualities and abilities	has no allergies						
	has general physical fitness						
	has physical strength						
	has stamina						
	has a tolerance of heat						
	has a tolerance of noise						
	has a tolerance of odours						
Social and communication skills	has competence in professional communication						
	has competence in written expression						
	has an ability to foster contacts						
	has the ability to negotiate						
	can participate actively in discussions						
	can participate in meetings						

Table 7 (Continued) - Comparative table for the results of a survey of teaching staff and employers (T – teachers, E – employers) for Bachelor, Masters and PhD student levels

Competence		Bachelor		Master		PhD	
		T	E	T	E	T	E
	has teaching ability						
Vocational skills and competences (aquaculture/ fishery)	has basic knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring						
	has professional knowledge in the field of ichthyology, aquaculture, environmental protection, fisheries and environmental monitoring						
	has a readiness for organizational and managerial work with small teams						
	is willing to lead a team in the field of their professional activity						
	can use basic materials and equipment						
	can use special materials and equipment						
	can make decisions as to when and where to use material and equipment						
	has the ability to keep documentation of field fisheries observations						
	has the ability to keep documentation of experimental and production work						
	can perform book-keeping activities						
	can apply theoretical and experimental research methods in a team						
	is able to do a self-study of new research methods						
	has skills of methodologies for theoretical and experimental research in the field of fisheries/aquaculture						
	has knowledge of the culture of scientific research in the field of fisheries/aquaculture, including using the latest information and communication technologies						
	has the ability to plan, implement and evaluate research						
	is able to organize and evaluate the work of the research fisheries team						
	is able to teach in the main educational programs of higher education						

Table 7 (Continued) - Comparative table for the results of a survey of teaching staff and employers (T – teachers, E – employers) for Bachelor, Masters and PhD student levels

Competence		Bachelor		Master		PhD	
		T	E	T	E	T	E
Vocational skills and competences (environmental management)	has knowledge about the methods for assessing the representativeness of material and statistical methods for comparing the data obtained						
	can organize research and development						
	has the ability to undertake independent research work						
	has the ability to independently carry out research activities in the relevant professional field using modern research methods and information and communication technologies						
	is ready for teaching activities in the main educational programs of higher education						
	has a basic knowledge of mathematics, physics, chemistry and biology						
	has professionally profiled knowledge and practical skills in geology, geography, general soil science						
	has basic general professional (general environmental) ideas about the theoretical foundations of general ecology, geoecology, human ecology, social ecology, environmental protection						
	has knowledge of the fundamentals of the doctrine of the atmosphere, hydrosphere, biosphere and landscape ecology						
	has knowledge of the basics of nature management, environmental economics, sustainable development, environmental impact assessment, legal fundamentals of nature management and environmental protection						
	has the ability to understand, state and critically analyze basic information in the field of ecology and nature management						
	has knowledge of the theoretical foundations of environmental monitoring, regulation and reduction of environmental pollution, industrial systems and environmental risk						
	is able to formulate solutions for problems, tasks and methods of scientific research						

Table 7 (Continued) - Comparative table for the results of a survey of teaching staff and employers (T – teachers, E – employers) for Bachelor, Masters and PhD student levels

Competence		Bachelor		Master		PhD	
		T	E	T	E	T	E
Transversal and key skills and competence (aquaculture/ fishery)	can participate in the assessment of the fishery value and ecological status of natural and artificial reservoirs						
	can organize of the assessment of the fishery value and ecological status of natural and artificial reservoirs						
	has ability to assess the status of populations of commercial fish and other aquatic organisms						
	can develop of biological justifications for optimal fishery parameters, general allowable catches, catch forecasts and fishing rules						
	can organize fisheries surveillance activities						
	is able apply of methods and technologies of artificial reproduction and cultivation of aquatic organisms						
	has knowledge about fight against infectious and invasive diseases of aquatic organisms						
	has knowledge about operation of technical equipment in aquaculture						
	can organize aquaculture process control						
	can take part in the research						
	has ability to independently and under the supervision of a scientific adviser collect and process biological, environmental and fisheries information						
	can take part in the development of biological substantiation of hatchery projects, spawning-growing farms						
	has ability to set research objectives, choose experimental methods and provide research results						
	has ability to plan the necessary experiment						
	has ability to independently plan and carry out the collection and primary processing of biological, environmental and fisheries information						
	can professionally perform, draw up and report on the results of scientific work						
	has ability to ensure the rational use, protection and management of aquatic biological resources						
	is able professional operation of modern equipment and instruments						

Table 7 (Continued) - Comparative table for the results of a survey of teaching staff and employers (T – teachers, E – employers) for Bachelor, Masters and PhD student levels

Competence		Bachelor		Master		PhD	
		T	E	T	E	T	E
	can organize of personnel to ensure the management of technological processes in aquaculture						
	has knowledge about economic analysis in the organization and planning of enterprises						
	is able to work with personnel, assessment of quality and productivity						
	can develop and optimize of technological processes in aquaculture						
	is able to teaching biological disciplines						
	has ability to methodically competently build a lecture plan						
Transversal and key skills and competence (environmental management)	has possession of the basics of design activities						
	has possession of the expert and analytical activities and research using modern approaches and methods						
	can develop of practical recommendations for nature conservation and sustainable development						
	has knowledge of regulatory documents and laws						
	can conduct environmental review and audit						
	can research and can doing scientific-production work						
	can lead and organize of research and scientific-production work						
	has possession of theoretical and practical knowledge for pedagogical work						
	can develop and apply of environmental management and environmental protection technologies						
	has possession of methods of sampling						
	can conduct chemical-analytical analysis of harmful emissions into the environment						
	has skills in operation of treatment plants, treatment facilities and landfills						
	can predict man-made disasters and their consequences						

Table 7 (Continued) - Comparative table for the results of a survey of teaching staff and employers (T – teachers, E – employers) for Bachelor, Masters and PhD student levels

Competence		Bachelor		Master		PhD	
		T	E	T	E	T	E
	can implement of technological processes for the processing, utilization and disposal of solid and liquid wastes						
	has knowledge of the legal foundations of environmental management and environmental protection						
Transversal and key skills and competence (environmental management)	has theoretical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit						
	has practical knowledge of environmental monitoring, environmental impact assessment, environmental management and audit						
	has possession of methods for preparing documentation for environmental review of various types of project analysis						
	has ability to carrying out environmental engineering studies to assess the environmental impact of various types of economic activity						
	has environmental policy skills in enterprises						
	has ability to present and critically analyze basic information in the field of ecology and nature management						
	can doing laboratory research under the supervision of specialists						
	can proper use of laboratory equipment						
	has ability to efficient use of laboratory equipment						



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Education, Audiovisual and Culture Executive Agency



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education for sustainable development
(TUNASIA - EPP 586144-2017)**

TUNASIA-Partners:

- Nha Trang University (NTU), Vietnam
- Nong Lam University - Ho Chi Minh City (NLU), Vietnam
- Thai Nguyen University of Agriculture and Forestry (TUAF), Vietnam
 - Ministry of Education And Traing (MOET), Vietnam
 - Institute of Oceanography (IO), Vietnam
 - Khon Kaen University (KKU), Thailand
 - Maejo University (MJU), Thailand
- Galway Mayo Institute of Technology (GMIT), Ireland
- University Of Wolverhampton (UoW), UK
- Link Campus University (LCU), Italia
- Alternative aquaculture association of Lithuania (AAA LT)
- OSTFALIA - Hochschule Braunschweig/Wolfenbüttel (OHBW), Germany