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**A concept for life saving on water areas in Ukraine**

**Abstract**

The article is dedicated to the analysis of water rescuers vocational training. The profession of water rescuer is one of the basic specialities in the area of civil protection. The aim and objectives of water rescuers training have been described. The problems of theoretical and practical training have been determined and the prospects for further research which are necessary for approach to European standards have been underlined. The models of water rescuers training and divers training in Ukraine have been proposed.

**Keywords:** water rescuer, training, diver, risk.

**Introduction**

Life safety and human security are the main priorities of the society. Government control over water conservation and reproduction of water resources is carried out by the Cabinet of Ministers of Ukraine, local councils and their executive bodies, government authorities and other authorities according to the legislation of Ukraine. Government authorities that carry out control over water conservation and reproduction of water resources are as follows:

– central executive body that ensures public policy in the area of environmental protection;

– central executive body that implements public policy in the area of environmental protection;

– central executive body that implements public policy in the area of water management;

– central executive body that implements public policy in the area of geological study and rational use of mineral resources;

– central executive body that implements state monitoring (control) in the area of water conservation and reproduction of water resources,

– other authorities in obedience to the law[[1]](#footnote-1).

Water safety and water rescue activities in Ukraine are provided directly by Ukrainian non-governmental organization Water Rescue Society and the State Emergency Service of Ukraine. Their objectives are as follows:

* life and health protection on water areas (accident prevention, teaching people basic skills of self-rescue and helping someone who is in trouble);
* organization of lifeboat stations and posts in the places of public bathing;
* monitoring and control over floatation devices.

Violations of basic rules and security measures on the water areas often lead to drowning. Mortality from drowning is approximately 7% of the total number of deaths because of accidents.

The role of rescuers on water areas is really great. Rescuers have to control people behaviour, inform everybody about dangerous areas, offshore streams, explain the main rules of conduct on the beach, etc.

Conventional methods on the drowning prevention (information about risks on the water, swimming training, using mass-media, patrolling the beaches, etc.) have already sputtered out, as they are not able to solve the problems. Therefore, it is necessary to search for new tools that allow making security measures on the water areas more effective.

The modern concept of life safety and health protection on water areas takes into account conclusions of standing committees on ecology, natural resources and recreation, budget and socio-economic development, communal property. It is built in obedience to the principal statutory instruments, such as:

– Constitution of Ukraine[[2]](#footnote-2);

–  Civil Defence Code of Ukraine[[3]](#footnote-3);

– Water Code of Ukraine[[4]](#footnote-4);

– Decree *on high priority measures of drowning prevention in Ukraine*[[5]](#footnote-5);

– Resolution *on accounting of leisure areas on water areas*[[6]](#footnote-6);

– Resolution *on Statute of Universal State System of Prevention and Response to ES*[[7]](#footnote-7);

– Order *on approval of Safety instructions on water areas of Ukraine*[[8]](#footnote-8);

–  Order *on Statute of diving service of MES of Ukraine*[[9]](#footnote-9).

Statutory instruments noted above contain mandatory rules for local authorities, sanitation stations, state administrations of environmental protection and municipal emergency services. The main causes of on-water incidents or fatalities are:

* Lack of information and preventive work among the population;
* Violation of safety rules during swimming, boating, fishing etc.
* Less-than-prompt response of rescue units to on-water incidents;
* Tardy identification of public bathing places, boating and fishing on the part of the local governments, owners and tenants;
* Lack of lifeboat stations and posts in the places of public bathing (especially in non-urban area).

Problems associated with unintentional drowning require urgent solutions at the country community levels. Local authorities must provide the following priority actions:

* + Prophylactic work among citizens focused on teaching people basic skills for self-rescue and for helping someone who is in trouble;
  + Registration, certification, inspection and comprehensive assessment of the places of public bathing, boating and fishing on water areas of different forms of ownership;
  + Inspection of bed relief and water quality at the places of public bathing, boating and fishing before the start of the swimming season;
  + Permanent sanitary and epidemiological control of water at the places of public bathing throughout the swimming season;
  + Passportization of the places of public bathing before the start of the swimming season;
  + Municipal lifeboat stations development;
  + Seasonal lifeboat posts development;
  + Personnel's professional training and skills maintenance;
  + Inventory and logistics management of rescue units, purchasing of the necessary equipment;
  + Improvement of rescue units’ operational efficiency;
  + Patrolling of public bathing places in order to maintain public order and prevent on-water incidents.

Many experts in Ukraine and abroad have scientific works dedicated to drowning prevention. Helpful hints were obtained byV. Yu. Davydov, F.A. Demidov, A.Z. Zaichenko, V.P. Zenkovych I. Kul, M.I. Leontiev, O.K. Pronin, V.L. Lopukhin, M. Meyell, D.J. Petstsin and many others.

**Problem statement.** According to statistics given by local authorities, 782 460 nonindustrial accidents happened in Ukraine from January to June 2016. 784 388 people suffered. Many people (including children) died as a result of unintentional drowning (Fig. 1).

Figure 1. Unintentional drowning

 Source: author’s calculations based on information about nonindustrial accidents in Ukraine.

Training of new lifeguards and divers is one of the main tasks. Professional divers and rescuers must pay much attention to teaching people some basic skills of self-rescue and helping someone who is in trouble. Work with pupils of general upper secondary school is the most efficient. It gives them skills of self-aid and mutual-aid providing, generates strong interest in rescue and maritime affairs and acquaints them with the concept of healthy and safe life in modern society[[10]](#footnote-10).

Personnel training allows reaching many goals such as:

* + Organisation of useful, healthy and safe recreation on water for children and adolescents.
  + Training of young rescuers for active participating in the protection of human health and life on water areas.
  + Teaching children and teenagers some basic skills for self-rescue on water areas, involving them in water sports.
  + Teaching safety instructions, swimming and diving rules.
  + Training practical skills of using lifeboats, lifesaving equipment, rescue tools.
  + Strength, agility and endurance development.
  + Education of patriotism and respect for nature.
  + Learning the basics of maritime affairs.
  + First aid skills obtaining.
  + Preparation for water rescue sports competitions and military programs.
  + Training readiness to correct actions in extreme situations on water.

During classes with children learning through play is often used. The game, along with the work and training, is a type of human activity which characterizes the amazing phenomenon of existence. This is a type of activity in real conditions aimed at reproduction and assimilation of social experience. Future rescuers’ training types are shown in fig. 2.

*Figure 2. Future rescuers’ training types*

Future rescuers’ training types

Theoretical knowledge

Theoretical knowledge

Theoretical knowledge

Practical know-how and skills

Practical know-how and skills

Practical know-how and skills

Source: author’s research

Future rescuers training can be conducted in such forms: lectures, practical classes, self-preparation. Learning fundamentals of safety on water areas include acquisition of theoretical knowledge and practical know-how. The development of water rescue concept considers taking into account foreign experience. For example, it stands to mention such authorities:

* + - The International Life Saving Federation (ILS) is the world authority for drowning prevention, lifesaving and lifesaving sport. ILS leads, supports and collaborates with national and international organisations engaged in drowning prevention, water safety, water rescue, lifesaving, lifeguarding and lifesaving sport[[11]](#footnote-11).
    - World Confederation of Underwater Activities (C.M.A.S) – organisation that comprises over 130 federations from 5 continents. In addition to organizing international underwater sport events it is at the forefront of technical and scientific research and development;
    - Lviv State University of Life Safety;
    - Central Diving Rescue Service of Ukraine[[12]](#footnote-12).

Future rescuers training have to start with swimming, diving and first aid treatment. The model of water rescuers training in Ukraine is shown on Fig. 3.

Figure 3. Model of water rescuers training in Ukraine

Source: author’s research

Because of high mortality rate due to unintentional drowning, water rescuers training is one of the principal aspects of the national safety.

Work in State Emergency Service of Ukraine requires that the rescuers be responsible, decisive and tech knowledgeable. Protecting people against risks that they may be exposed to while bathing or swimming is the main task of Diving Rescue Service. Different preventive measures are conducted to prevent loss of life. Such measures usually include: beaches overseeing; oral and written instruction on safety rules during swimming, boating, fishing etc; using posters, rescuers training.

Water rescuer's work always carries risk. Therefore, future rescuers must pass special training and confirm that their knowledge and skills allow them performing their duties. Otherwise, rescue operations can lead both a victim and a rescuer to injury and even death.

Using a risk-oriented approach to the water rescuers training it is necessary to emphasize two main principles:

* + skill formation;
  + emergency prevention.

These objectives can be realized in virtue of solving problems on the formation of relevant knowledge and skills. It is to be noted that practical skills prevail.

Acquiring of knowledge and skills usually comes with consolidation of such necessary personal qualities as decision-under-risk promptitude, psychological stability, physical mobility and stamina.

The aim of the water rescuers training is to get a professional who has:

* + Perfect awareness of the coastal zones, beaches, swimming pools and their equipment, types of waves and courses, safety instructions on water areas;
  + The ability to take stock of the situation and to decide upon whether to conduct rescuing and other emergency operations;
  + Practical skills to administer first aid;
  + Experience of rescue operations and humane relief service.

As a result, a water rescuer **should know:**

* + Main operation algorithms;
  + General information about the coastal zones, beaches, swimming pools and their equipment, types of waves and courses, safety instructions on water areas;
  + Regulations on the use of special rescue vehicles, devices, and other equipment;
  + Safety instructions on water areas at children summer camps;
  + Regulations on victims search and transportation;
  + Reanimation procedures;
  + Safe work practical rules;
  + Basics of emergency survival.

A water rescuer **should be able to:**

* + Perform all rescue actions correctly and rapidly;
  + Apply special rescue vehicles, devices, and other equipment;
  + Play it off the cuff;
  + Administer first aid using special medical equipment, carry out reanimation, defibrillation;
  + Swim well;
  + Provide proper background for work and rest.

A water rescuer **should be acknowledged with:**

* + - legislative framework in the field of water management, Water Code of Ukraine, legal status of forelands;
    - main schemas and sketch of swimming pools and beach constructions;
    - domestic and foreign experience of water rescuing.

To improve motivation and to increase the efficiency of educational activities the elements of problem-based learning must be introduced to the educational process. The situational problems have to be included.

At the first stage of training process general information about coastal zones, lifeboats, beaches, swimming pools, types of waves and streams is given. After that future rescuers learn regulations on victims search and transportation, reanimation procedures, safe work practical rules. Such information helps to avoid unforeseen situations. People behaviour at a critical juncture is often unpredictable so that it can cause difficulties.

**Classroom training** includes:

* + Learning of natural phenomena and principles of ecology;
  + Learning of coastal relief peculiarities and general information on coast types, waves, streams etc;
  + Studying psychological characteristics of human behaviour in emergencies;
  + Studying human anatomy and physiology;
  + Medical training.

Lectures should be conducted with appropriate visual aids and material support.

It is also recommended to use posters and videos snippets that demonstrate various emergencies on the water areas. It is necessary to bring up students to speed on rescue tools and equipment. Lectures should be conducted in the classrooms using technical training equipment. The groups should not be large (10-15 people).

**Practical training** is held in order to:

* + - deepen theoretical knowledge and practical methods of working with rescue equipment, tools and devices;
    - master the skills of rescue work on the water areas.

Practical training begins with pre-starting procedures with equipment, tools and devices. Then special exercises with rescue equipment, tools and devices, are performed. Methodology considers such stages: initial briefing, an exemplary demonstration, performing of the exercises.

**Medical training.** Medical training classes are conducted by health professionals in swimming pools or special classrooms using simulation tools, simulators and safety devices. Classrooms and swimming pools must be equipped with visual aids, models and expedient means for first aid. Video and photographs must be used.

At the beginning of each lesson an instructor explains and shows the sequence of first aid steps. Then the group (8-10 persons) practice first aid steps with simulators and safety devices.

During the lesson it is recommended to use such training aids:

* + - posters;
    - multimedia and projection equipment;
    - personal protective equipment;
    - special equipment, tools and devices;
    - specialized class-rooms;
    - pools or open water areas;
    - training simulators and systems.

**Self-preparation.** During this phase future rescues can study small and available for learning topics, draw diagrams and models for lectures, work with special software application, solve situational tasks, practical tasks with maps, plans, schemes, train skills of work with special equipment and improve swimming.

The results of self-preparation can be checked using various forms of control: tests, oral questioning and so on.

**Control.** It is necessary to monitor quality of the training process. Final control should be sent to check the practical skills of the first aid and the work with rescue tools, equipment It is important to maximize the use of computer technologies for monitoring of the quality.

In-depth study of the water rescuers work helped to reveal physical properties and physiological qualities required for the profession: stamina, decision-under-risk promptitude, pliancy of mind, carefulness, psychological stability and physical mobility.

Every rescuer must have good health, perfect physical preparation, stamina and readiness to serious physical and psychological stressing. Psychological readiness is one of the main qualities because human lives depend upon it. Rescuers have no right to make mistakes.

The profession of water rescuer also requires good ability to contact with colleagues, to find a common language with children, victims, etc.

Content of training materials makes it possible to form a complete picture of the requirements as to water rescuers (Table 1).

Table 1

|  |  |  |
| --- | --- | --- |
| # | Course unit | Hours per week |
| 1 | **Classroom training** | 20 |
| 1.1 | The essence of water rescue activities in Ukraine. Basics of water rescuing | 1 |
| 1.2 | Requirements to lifeboat stations and posts in the places of public bathing | 1 |
| 1.3 | Methods of working with rescue equipment, tools and devices | 2 |
| 1.4 | Operation technique of working with rescue equipment, tools and devices | 2 |
| 1.5 | Water rescue tactics. Search and rescue activities on water areas | 3 |
| 1.6 | First aid measures | 3 |
| 1.7 | Means of communication | 2 |
| 1.8 | Operation technique of working with lifeboats | 2 |
| 1.9 | Labour safety | 4 |
| 2 | **Practical training** | 20 |
| 2.1 | Search and rescue activities on water areas using rescue equipment, tools and floatation devices. Transportation of victims | 8 |
| 2.2 | Search and rescue activities on water areas using lifeboats and other water crafts. Emergency services calling. | 6 |
| 2.3 | Search and rescue activities on water areas by swimming | 6 |
| 3 | **Personnel certification** | 8 |
| Total | | 48 |

*Source: author’s research due to* *Order from the SES of Ukraine #92 of March 22,* *2013*

After training water rescuers get all necessary knowledges and practical skills (fig. 4).

*Figure 4. Concept of water rescuers training*

1. Professional swimmer

Special training (including

diving, boating)

3. Water rescue instructor

Coach-instructor

Instructor

2. Water rescuer

**Classroom training**

Peculiarities of coastal relief formation

Human anatomy and physiology

General information on water areas

Accident prevention   
in winter

Information on children's camps

Information on coast types, waves, streams

Rules of conduct on water areas

Psychology, victimology

**Practical**

**training**

Rescue activities in summer and in winter

Search and rescue

Transportation of victims

Reanimation and defibrillation

First aid measures

Swimming

Rescue equipment

Diver

|  |
| --- |
|  |
|  |  |

*Source: author’s research due to ILS standards.*

Optional courses of diving training are conducted at Lviv State University of Life Safety. Divers are divided into 3 qualification classes due to their theoretical knowledge, practical experience, skills and the peculiarities of diving operations:

* + - Divers of the 3rd class;
    - Divers of the 2nd class;
    - Divers of the 1st class.

Classes are assigned after completing a training or re-training course and passing the exams. Level of competence in a function allows evaluating the divers qualification.

Documents certifying the diver’s qualification are:

– Proficiency certificate;

– Personal book of a diver, which contains all information about the initial qualification and its subsequent changes.

Depending on the seniority of staff, diving structure is divided into:

* + Divers of the 3rd, the 2nd and the 1st class;
  + Diving station officers;
  + Diving instructors;
  + Diving masters;
  + Diving experts;
  + Senior diving experts;
  + Chief diving experts;
  + Sailor divers;
  + Scuba divers.

Divers’ specialties are divided into basic and auxiliary.

Basic specialties are:

* + - Divers of the 3rd, the 2nd and the 1st class;
    - Diving experts.

Auxiliary specialties are:

* + - gas-cutting diver;
    - diver-welder;
    - frog-man;
    - scuba diver, and others.

Due to the nature of work all diving operations are divided into the following groups:

**I group** – the construction and repair of underwater parts of the waterworks, and oil-rig drilling equipment; laying and repair of pipelines and cables; underwater ship raising and rescue work; dredging work; ship repair and hulls cleaning, metalwork and installation work; maintenance underwater equipment at marine oil- and gas-fields; experimental diving descents;

**II group** – operational maintenance of underwater parts of hydraulic structures, waterways and channels, maintenance of pipelines and cables (apart from marine oil- and gas-fields); maintenance of research (apart from experimental diving descents);

**III group** – rescue diving operations at the lifeboat stations and posts; inspection and cleaning of the bottom of water areas at the places of public bathing, boating and fishing.

Diver of the 3rd class qualification is assigned to the place of primary education. Diver of the 2nd class qualification can be assigned to a diver of the 3rd class, who took additional training. Alongside this diver has to have length of underwater work for at least of 1000 hours (I-II group of work) or not less than 300 hours (III group of work). Diver of the 1st class qualification can be assigned to a diver of the 2nd class, who took additional training. Alongside this diver has to have length of underwater work for at least of 2000 hours (I-II group of work) or not less than 400 hours (III group of work).

A diver who has an auxiliary specialty (e.g. operator of gas-cutting equipment or welder) must know the structure of equipment for underwater welding and metals cutting. Also it is necessary to know proper safety regulations. The model of divers’ training in Ukraine is shown on Fig. 5.

Figure 5. Model of divers training in Ukraine

*Source: author’s research in obedience to the principal statutory instruments and due to CMAS standards.*

**Conclusion.** According to the analysis of water rescuers’ training and evaluation of unintentional drowning risks, a new concept for life saving on water areas has been developed. The models of water resquers training and divers training in Ukraine have been proposed.

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**Koncepcja ratowania życia na obszarach wodnych Ukrainy**

**Streszczenie**

W artykule została przedstawiona analiza kształcenia zawodowego w zakresie ratownictwa wodnego, jako ważnej specjalności w obszarze ochrony ludności, znajdującej istotne miejsce w polityce i celach operacyjnych rządu. Określono także cele i zadania szkoleń w ratownictwie wodnym oraz problemy teoretyczne i praktyczne szkolenia, a także perspektywy dla dalszych badań w celu konwergencji do standardów europejskich. Proponowane opracowanie koncepcji i przeprowadzenie ratowniczych na wodzie na Ukrainie i model szkolenia ratowników i nurków w wodzie.

**Słowa kluczowe:** ratownictwa wodnego, szkolenia, ryzyko nurka.

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