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**DEVOTED TO DISTRIBUTION OF FLOWERING PLANTS WITHIN OFFSHORE STRIP OF THE AZOV SEA (IN CONNECTION WITH THEIR INCLUSION INTO “RED DATA BOOK OF PRIAZOVSKY REGION”)**

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**Introduction**

Creating of Red Data Books and Lists is one of the most important elements in a complex of steps aimed at preservation and renewal the natural phytodiversity within separate countries and regions. “Red Data Book of Priazovsky region. Vascular plants / edited by PhD (doctor of biological sciences) V.M. Ostapko, PhD (candidate of biological sciences), docent V.P. Kolomijchuk. – Kiev: Alterpress, 2012. – 276 s.”, which was published recently doesn't have a legal status as the following publications have: "IUCN Red List of Threatened Species", "European Red List of Vascular Plants", “Red Data Book of Ukraine” and “Red Data Book Of Russia” [7, 33, 34]. At the same time role of “illegal” publications is important as well, as they, summarizing information on the regional level, are the basic to put rare taxons into international and national legal documents.

Publication of Red Data Book of Priazovsky region was preceded by a quite serious spadework, which involved specialists in Botany of leading scientific and research, scientific and pedagogical establishments of Ukraine and Russia. Supervisors of this project invited experts at expeditional and field investigations within Priazovye, and that permitted not only to compile published data but obtain original “first-hand” information. That's why release of this publication is an extremely positive and global event. For sure it will favor efficiency and increasing of nature conservation steps which are taken on all possible levels to solve ecological problems of that region. At the same time this project has some faults as any serious one. Unfortunately on the stage of forming the book into essays devoted to flowering plants growing in coastal water area, false skeleton maps were used without agreement [23-27]. These figures have general idea neither with authorial versions of maps nor with real picture of taxon distribution. For example, *Ruppia maritime* (as other four “maritime taxons”) cannot inhabit in the center of the Azov Sea, though published figure indicates the opposite [23: p.256]. As far as maps of rare species distribution are the most important element of nature conservation report, we made a list of corrections in this research (inset). But when mistakes were found out, a part of printed copies had been sold. Indicated incongruities have still mislead an unprepared reader (this book is intended for a wide audience) and naturally causes confusion of specialists.

That's why purpose of this publication is to present distribution skeleton maps of five flowering plant taxons (*Ruppia cirrhosa* Petagna (Grande), *Ruppia maritima* L., *Zannichellia palustris* L. subsp. *polycarpa* (Nolte) K.Richt., *Zostera marina* L. and *Zostera noltii* Hornem.) in the coastal water area of the Azov Sea and the Kerch Strait.

### Objects and research methods

In terms of this work analysis of the followings was carried out: private investigation results for 1990-2012 [15-22, 28-31] and literature data [1-6, 8, 10, 12, 13] concerning distribution of *Ruppia cirrhosa*, *Ruppia maritima*, *Zannichellia palustris* subsp. *polycarpa*, *Zostera marina* and *Zosterhe noltii* in Priazovsky region (coastal water area of the Azov Sea and north part of the Kerch Strait up to Tuzla island, including coastal lakes and lagoons)<sup>2</sup>. Applying nomenclature corresponds to “Vascular plants of Ukraine: A nomenclatural checklist” by Mosyakin S.L. [39]. Outline map of the region and approaches used for report “Red Data Book of Priazovsky region. Vascular plants” were applied during formation of skeleton maps.

### Results and discussion

Summary of original and literature data presents the following picture: *Ruppia cirrhosa*, *Ruppia maritima*, *Zannichellia palustris* subsp. *polycarpa*, *Zostera marina* and *Zostera noltii* – long-rhizomatous herbacious perinual plants with life cycle in aquatic environment (eugidatophytes) [9, 37, 41]. In Priazovsky region they don't create dense growth and can be found in sublittoral of coastal water areas (mainly *Zostera* cultivars), and in coastal lakes and lagoons with different salinity level (besides seasonally drying up reservoirs as a rule) (fig.1). At depth of 0,2 – 3-5m their mono- and oligodominant cenosis occupy loose earth with different granulometric composition (from silt and sand, preferable environment for *Zostera* cultivars up to shell rock and gravel, more preferable medium for *Zannichellia*. Depending on biotope type, cenosis biomass ranges widely: from 0,2-05 – 3(5) kg/m<sup>2</sup>. All mentioned taxons are characterized by fluctuation of biomass, number and morphometric parameters of shoots, which is connected with seasonal cyclic changes of the main hydrologic environmental characteristics; local changes caused by direct or mediated anthropogenic effect are registered as well. In general decreasing of growth area (either along the coast or going into depth) and reduction of principal population parameters take place in this region.

Cenosis of flowering plants create productional basis of coastal-marine and lagoon biotopes, which are characterized by abundant and diverse biota (including valuable marketable and rare cultivars of marine and coastal-marine fauna) which is preserved according to EU Habitats Directive (92/43/EEC; codes 1110, 1150 and 1160) [40]; growths slow down abrasion in the coastal zone and favor sedimentation and autopurification of water. Mass seasonal ejection of *Zostera* functions as a source of valuable raw materials to produce some components for building materials, fertilizers, feed additives and etc.

Anthropogenic activity as follows is as main threats as limiting factors which cause mechanical fragmentation and destruction of habitats or critical transformation of hydrologic regime of coastal marine water areas (regime of pumps and sedimentation, hydrodynamics, water transparency and other hydrophysical and hydrochemical parameters): build-up of the sea coastline including hydrobuilding, sand recovery and deposition, recreation, coastal fishery of hydrocoles by gears, eutrophication by household effluents and pollution from industrial enterprises and traffic infrastructure.



**Distribution of *Ruppia cirrhosa* Petagna (Grande)**  
fig.191.  
(instead fig.190 p.254 [23])



Distribution of *Ruppia maritima* L. (instead  
p.256, [24]).



Distribution of *Zannichellia palustris* L. subsp. *polycarpa* (Nolte) K.Richt. (instead fig.198 p.266, [25])



Distribution of *Zostera marina* L. (instead fig.199 p.268, [26]).



Distribution of *Zostera noltii* Homem. (instead fig. 200 p.271, [27]).

**Fig.1 Maps of flowering plant distribution in Priazovsky region (coastal water areas of the Azov sea and north part of the Kerch strait up to Tuzla island including coastal lakes and lagoons)**

Study taxons are presented in official and unofficial international, national and regional Red Data Books and Lists<sup>3</sup>: *Zostera marina* – ①③④⑤⑥⑦⑧; *Zostera noltii* – ①④⑤⑥⑦⑧; *Ruppia cirrhosa* – ①②⑥⑦; *Ruppia maritima* – ①②⑥⑦; *Zannichellia palustris* subsp. *polycarpa* – ②⑥⑦. They grow on borders of preserve objects with different rank (from national up to local) [23-27]. Though protection in Priazovsky region is mainly declarative, special measures are not initiated.

### Conclusions

Result analysis of private observations and special publications indicate that *Ruppia cirrhosa*, *Ruppia maritima*, *Zannichellia palustris* subsp. *polycarpa*, *Zostera marina* and *Zostera noltii* are still widespread in coastal water areas of Priazovsky region. But reduction of growth area, decreasing of the main population parameters as well as type of threats and protection level make them more and more vulnerable. As a result points of preservation and renewal of flowering plant growths along the sea coastline are of crucial importance in those countries where study taxons were considered as traditional object of trade. The most effective nature protective measure is making a reserve of water area where coastal biotopes with study taxons left (Directive 92/43/EEC). At the same time area of protected land and water objects with a high status should be increased.

<sup>3</sup>① - IUCN Red List of Threatened Species [38, 42-45]; ② – European Red List of Vascular Plants [34]; ③ - Convention on the Conservation of European Wildlife and Natural Habitats (Appendix I); ④ – Black Sea Red Data Book [35]; ⑤ – Black Sea Red Data List [36]; ⑥ – Red data Book of Priazovsky region [23-27]; ⑦ – A list of plant cultivars being in need of species protection on the territory of ARC (agreed res. VR ARC from 21.06.2013 № 1323-6/13), ⑧ –Red Data Book of Donetsk region [32].

Creation of large national parks is the most effective measure. It will make possible to control and regulate forms and intensity of economic management not only within reserve territory but in region having touristic and recreational potential totally.

That is why publication of authentic information about their distribution within Azov and Black Sea region is actual and well-timed. Further researches make it possible to gain and clarify data in the matter. Creation of Red Data Books and Lists with different status is of great importance as well. Mentioned taxons were recommended for "List of plant cultivars being in need of special protection on the territory of Autonomous Republic of the Crimea" to include them into Red Data Book of the Crimea, which was renewed for development after 15-years break [11].

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**Sadogursky S.E., Stepanjan O.V., Belych T.V., Sadogurskaya S.A. Devoted to distribution of flowering plants within offshore strip of the Azov Sea (in connection with their inclusion into “Red Data Book of Priazovsky Region”)** // Bull. of the State Nikit. Botan. Gard. – 2015. – № 115. – P. 26-31.

The article includes author's versions of distribution skeleton maps of *Ruppia cirrhosa* Petagna (Grande), *Ruppia maritima* L., *Zannichellia palustris* L. subsp. *polycarpa* (Nolte) K.Richt., *Zostera marina* L., *Zostera noltii* Homem. within offshore strips of the Azov sea and Kerch strait (coastal lakes and lagoons inclusive), so far as collective monograph “Red Data Book of Priazovsky region. Vascular plants” (2012) contains incorrect information.

**Key words:** *the Azov sea; the Kerch strait; flowering plants; distribution map.*

<sup>3</sup>Ⓞ - IUCN Red List of Threatened Species [38, 42-45]; Ⓜ - European Red List of Vascular Plants [34]; Ⓢ - Convention on the Conservation of European Wildlife and Natural Habitats (Appendix I); Ⓞ - Black Sea Red Data Book [35]; Ⓢ - Black Sea Red Data List [36]; Ⓞ - Red data Book of Priazovsky region [23-27]; Ⓢ - A list of plant cultivars being in need of species [rotection on the territory of ARC (agreed res. VR ARC from 21.06.2013 № 1323-6/13), Ⓢ -Red Data Book of Donetsk region [32].