

встановлено, що Кременчуцький промисловий регіон має мінімальний рівень екологічної безпеки.

Визначено заходи з мінімізації наслідків проявів екологічної небезпеки.

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**Marianna V. Plysiuk**

student specialty "Ecology",  
educational degree "bachelor"

Scientific supervisor: **Tetiana I. Bilyk**

Ph. D. in Biol. Sc., Associate Professor of the Ecology Department,  
NATIONAL AVIATION UNIVERSITY,  
Kyiv

### **INFLUENCE OF POLLUTION BY METABOLIC DISRUPTORS AND ANABOLIC STEROIDS ON WATER ECOSYSTEMS**

Water is the main component of the existence of all living things on earth, including man. Therefore, the control of the purity of water is given a significant amount. One of the reasons for pollution of water bodies and water sources is the receipt of toxicological substances such as anabolic steroids and metabolic disruptors.

Steroids are a general class of agents that all have the steroid ring in common. The steroid ring is composed of three 6-carbon rings and one 5-carbon ring joined,

of which cholesterol is the most basic form and, indeed, the precursor. Although the term steroid includes all agents derived from this ringed structure, this discussion includes only testosterone and the anabolic-androgenic steroids (AASs) [2].

Recently a significant number of these pollutants also contain waste water from enterprises for the production and processing of livestock products, which, after discharging them into natural reservoirs, pollute the water with residues of liquing and prophylactic means.

The main ones are antimicrobial drugs - antibiotics and sulfanilamides, antihelmintics, coccidiostatics, hormones and products of their degradation. Their influence on hydrobionts is ambiguous and depends on the type of xenobiotic, its concentration in water and duration of action. The widespread use of antibiotics in medical and veterinary practice as therapeutic and prophylactic means, as well as for stimulation of animal growth, helps to accumulate in waste - excrement, waste water, manure, soils and natural reservoirs. In the environment not only antibiotics, but also their active metabolites are allocated [1, p.384].

Anabolic steroids and their active metabolites are constantly fed into the environment through purified and untreated sewage.

Numerous studies have shown a very negative impact on water objects of insignificant amount of these substances entering them with sewage. They are weakly biodegradable and, passing through the treatment plants without any changes, fall into natural waters.

Steroid hormones are present in the environment due to use on livestock. This endocrine disrupting chemicals has possibly the least managed path to surface waters which then contaminate drinking water. Because it is used in hormone-enhancing products for feed animals, the waste produced by these animals frequently contaminates nearby groundwater sources.

Also, other sources of endocrine-disrupting compounds in our water, including synthetic estrogens in crop fertilizer, synthetic and natural estrogens from

livestock, including dairy cows, which can be fed hormones to increase milk production, and an unknown number of industrial chemicals, like plastic additive bisphenol-A. Studies with injection of labeled steroid indicate that domestic animals differ widely in their routes of excretion (Table 1.).

*Table 1*

*Percentage of infused labeled steroid excreted in feces*

Steroid	Sheep	Ponies	Pigs
Progesterone	77	75	34
Testosterone	44	28	14
Cortisol	28	59	7
Estrone	89	2	4

In wildlife, endocrine disruptors have been clearly shown to cause abnormalities and impaired reproductive performance in some species, and to be associated with changes in immunity and behaviour and skeletal deformities.

Some well established examples of adverse effects in wildlife include:

1. Imposex (male genitalia in female) in marine molluscs; known to be due to exposure to antifouling paints on ships that contain organotin compounds;
2. Feminisation (development of female gonadal tissue and production of an egg yolk protein, vitellogenin) in male fresh water fish in rivers or lakes exposed to treated sewage effluents, in many parts of Europe ; similar changes also being noted in estuaries;
3. Impaired reproductive development, and abnormalities of the reproductive system in alligators in a polluted lake in Florida USA, and in turtles in the Great Lakes, USA [3].

The relevant environmental agencies should formulate predictable no-effect levels for steroid compounds similar to the proposed predicted-no-effect-concentrations (PNECs) for natural and synthetic steroid estrogens in surface waters.

Simple low-technology processes such as buffer strips and composting can drastically reduce the amount of steroid hormones. Although not necessary economically justified for the sole purpose of removal of estrogens, buffer strips and composting have many other beneficial effects in protecting the environment. Therefore, composting and buffer strips should be an integral part of manure management programs [4].

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**Савельєва Анна**

**Гаріфуллін Сергій**

студенти спеціальності «Екологія, охорона навколишнього природного середовища та збалансоване природокористування»,  
освітній ступінь «бакалавр»

Науковий керівник: **Овчарук О.В.**

д.с.-г.н., професор кафедри екології та збалансованого природокористування,  
Подільський державний аграрно-технічний університет,  
м. Кам'янець-Подільський

## **ЕКОЛОГІЧНІ АСПЕКТИ ВИКОРИСТАННЯ АЛЬТЕРНАТИВНОГО ПАЛИВА ТА ТЕХНОЛОГІЇ ЙОГО ВИРОБНИЦТВА**

Сьогодні проблеми охорони природи вивчаються сучасним науковим розділом, що зветься інвайронментологія. Її методологічними засадами виступає теорія природокористування і концепція сталого розвитку людства: