SEASONAL DYNAMICS OF NUTRIENTS IN THE RIVER WATER AND ITS INFLUENCE ON PRODUCTIVITY OF THE COASTAL ZONE IN THE JAPAN/EAST SEA

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Rivers are the main source of terrigenous nutrients to the coastal sea and could be responsible for such adverse impacts as red tides or hypoxia and anoxia in the estuarine areas.

A color satellite image of MODIS showing the content of suspended matter entering with the river flow into the Amur Bay (a) and the high concentration of chlorophyll a (b) in the surface water of the Amur Bay in the summer season.

Seasonal distribution of chlorophyll (μg / l) in the surface water layer of the Amursky Bay in 2008:
- a - winter
- b - spring
- c - summer
- d - autumn

http://pacificinfo.ru
Goal:
Identify the impact of dynamics of nutrients in the river water on productivity of the coastal zone

- Map of the investigated region. The dots indicate the sampling location

To evaluate the rivers impact on chemical environments in the coastal zone, monitoring of the river water properties along the coast of southern Primorye is conducted in 2016 (and continues until nowadays).
Investigated rivers

Razdolnaya 245 km
S=16 830 km²

Artemovka 73 km
S= 1460 km²

Knevichanka 33 km
S= 476 km²

Partizanskaya 142 km
S= 4 140 km²
Investigated rivers

Barabashevka 61 km
$S = 576 \text{ km}^2$

Ryazanovka 34 km
$S = 155 \text{ km}^2$

Sokolovka 21 km
$S = 188 \text{ km}^2$

Kievka 105 km
$S = 3120 \text{ km}^2$
## Dates of sampling

<table>
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<tr>
<th>Rivers</th>
<th>II February</th>
<th>IV April</th>
<th>VI June</th>
<th>VIII August</th>
<th>IX September</th>
<th>X October</th>
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Monthly rainfall at meteorological stations in the valleys of the investigated rivers

Seasonal changes in the water content of rivers can be indirectly characterized by changes in monthly precipitation at weather stations located in or near their valleys.
The seasonal dynamics of temperature on the surface of the investigated rivers is also determined by the climate of the region, and its features by the geographic location of the rivers.
Dynamics of dissolved oxygen content and oxygen saturation for the investigated rivers

O2, мл/л

O2, %

Knevichanka, Artemovka, Partizanskaya, Kievka, Sokolovka, Razdolnaya, Barabashevka, Ryazanovka
Dynamics of silicate, phosphate concentrations for the investigated rivers

Dip_mKm/l

- Knevichanka
- Artemovka
- Partizanskaya
- Kievka
- Sokolovka
- Razdolnaya
- Barabashevka
- Ryazanovka
Dynamics of mineral nitrogen and ammonium nitrogen concentrations for the investigated rivers
Seasonal changes in the concentrations of phosphates, iron, and ammonium nitrogen in samples from the Knevichanka river.

The graphs show the dynamics of dissolved iron concentrations for the investigated rivers.

The linear regression equation is given as:

\[ y = 4.3219x - 0.1191 \]

with a coefficient of determination \( R^2 = 0.7298 \).
Influence on productivity of the coastal zone

- Transferred to the sea, the nutrient elements of terrestrial origin are converted back to organic matter enhancing the coastal waters productivity, but consequences of this impact are principally different for the natural regime with the winter-spring maximum and for the distorted regime with the summer-fall maximum.
Summary

- Therefore, eutrophication of the estuarine areas is developed because of coincidence of light and nutrients supply for photosynthesis. That’s why red tides are more frequent in the external estuaries of these rivers (though this problem is still inactual for the Russian waters) and hypoxia appears there at the sea bottom after the summer blooms because of biochemical consumption of oxygen for mineralization of the detritus.

- Prominent seasonal dynamics of chemical indicators is revealed that generally corresponds to seasonal changes of freshwater discharge caused by monsoon cycle of precipitations.
THANK YOU FOR YOUR ATTENTION

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