

PoM AND ECONOMIC ANALYSIS IN

RBMP in Macedonia



Kasam Zeqiri

Ministry of Environment and Physical Planning

E-mail: kasamzeqiri@gmail.com

20 June 2016, Albania.



River basins in Macedonia



The country is divided hydrographically into four river basins:

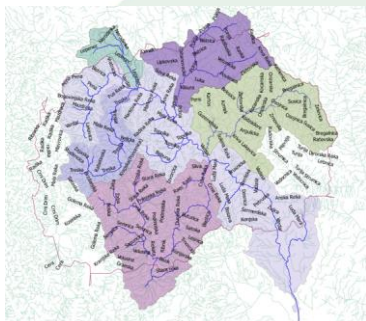
- Vardar
- Strumica
- Crni Drim and a small part of the
- South Morava river basin.

All the river basins in the country are international, shared with neighbouring countries

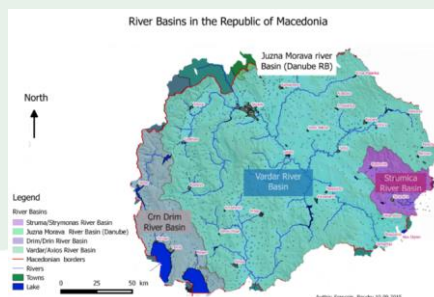


VARDAR RIVER DISTRICT

8 Sub - Basins



4 River Basins in the Rep. of Macedonia



Sub-basins shared with riparian countries



River Basin District

Rep. of Macedonia, Serbia, Kosovo, Greece

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INITIAL ELEMENTS VARDAR RBMP

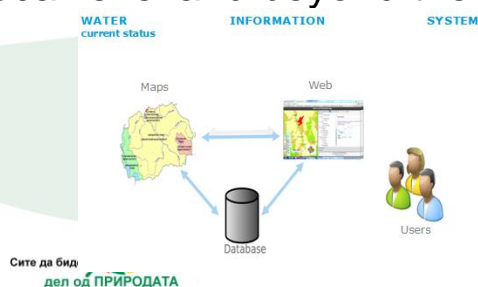
The river basin planning activities are devoted to the implementation of the initial elements of the River Basin Management Plan (RBMP) for the Vardar River Basin in the Republic of Macedonia.

- **Review** of the reports from projects in the Vardar River Basin,
- Delineation, typologies and initial **characterisation** of Water Bodies and the related GIS files,
- Identification and Mapping of **Protected Areas** in the Vardar River Basin,
- **Pressure and Impact**, Risk analysis,
- **Monitoring programme** and a road map towards its implementation

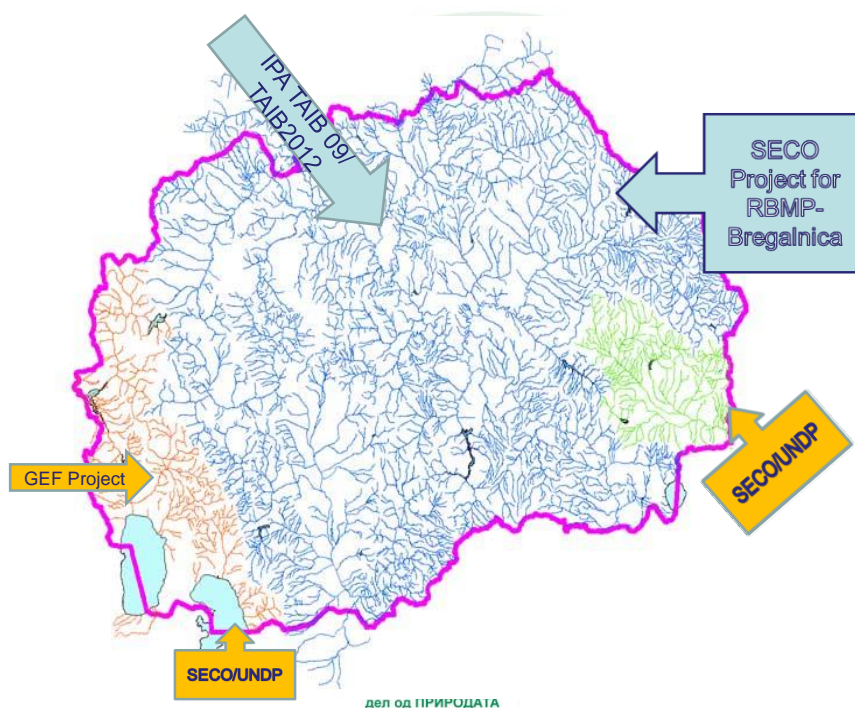
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Development of water information system

- **Case of VRB** there is develop a website (with the build-in link <http://wis.moepp.gov.mk> which share data and information for water resources at river basin at local level and beyond the national level.



6/23/2016



An overview on priority domains measures, the expected effects and priority for the Bregalnica RBM Plan, based on the present water body status and pressures. Priority domains for measures in the different pressure categories; medium and light shading show main and side effects, respectively;

Top ten priority domains for the Bregalnica RBM Plan are framed in red

| | Water Quality | Water Flows and Levels | Fish Migration, Beds and Banks |
|-----------------|--|--|--|
| Household | Land use control | use regulation | Water |
| | | Water use efficiency | |
| | Solid waste management | | |
| | Wastewater treatment | | |
| Industry | Land use control | use efficiency | Water |
| | Control of hazardous substances | | |
| | Wastewater treatment | | |
| | Solid waste management | | |
| Agriculture | Land use control | | Flood control |
| | Tilling techniques and soil erosion control | | |
| | | Water use regulation | |
| | | Water use efficiency | |
| Other Pressures | | Crop selection | |
| | Pesticides and fertilizers control | | |
| | Drainage control | | |
| | Land use control in forestry and on pastures | | |
| | | Water abstraction control in hydropower generation | |
| | Soil erosion control in forestry and on pastures | | |
| | | | Extraction control in mines and quarries |
| | Sludge control in mines and quarries | | |



Programme of measures – sensitivity analysis

Ranking of measures has been checked with different weights to particular criteria

- **Environmental** (impact, extent, security or preservation of resource, protection from harmful effects of water)
- **Socio-economic** (economic benefit, financial costs, social benefits)

Implementation of the Program of measures: 6-year cycle of implementation of the Plan 2015-2021, 2021-2027. If the measure can be realized (completed) within a cycle, it may be revised and included in the next cycle



Possible Implementation Strategies

Three (3) alternatives

- A '**Business as Usual**' Strategy ,
- A **Water Framework Directive Implementation Strategy** in which all the measures are implemented in full accordance with the WFD, ensuring the achievement of the environmental objectives.
- A **Realistic Implementation Strategy** in which some of the above measures are implemented based on the availability of economic resources, manpower and skills. → **Prioritization**



Effects – Environmental objectives

| Objectives | Sub-objective | Indicators | Alternatives | | |
|---|---------------------------------|--|---------------|-------------|------------|
| | | | "0" No action | 1 Realistic | 2 Full WFD |
| Overall Objective 1: Improvement of environmental conditions ensuring good water and soil quality for human health and ecosystem by 2025 Indicator: Measurable decline in levels of the main pollutant groups and pressures on water, sediment and biota | 1a: Good surface water quality: | Reduce/prevent further eutrophication/organic pollution | | | |
| | | Reduce/prevent further hydromorphological changes | | | |
| | | Reduce/prevent further habitat fragmentation | | | |
| | | Maintain biological water quality (phytoplankton, macrophytes, invertebrates and fish) | | | |
| | | Reduce/prevent hazardous substances pollution | | | |
| | 1b: Good groundwater quality: | Control water abstraction | | | |
| | | Reduce/prevent water pollution from point and non-point sources | | | |
| | | Maintain good physical and chemical characteristics | | | |
| | 1c: Good ecological | Reduce/prevent further eutrophication/organic pollution | | | |
| | | Reduce/prevent further hydromorphological changes | | | |
| | | Reduce/prevent further habitat | | | |

• ECONOMIC ANALYSIS

• **Cost-based valuation method –**

based on the assumption that the cost of maintaining an environmental benefit is a reasonable estimate of its value.

• **Necessity of Assessing Disproportionate Costs**

an approach for determining whether the total costs of the programme of measures are disproportionately costly is relevant for justifying derogation.



PoM – implementation schedule

| Rank | Score | ID | Programme of Measures Measures | Cost | | Impl.Period Duration [Y] | Proposed Alternatives | | | Initial 6-year WMP implementation period | | | Second 6-year WMP implementation period | | | Third 6-year WMP implementation period | | | 19 |
|------|-------|------|---|----------------|---------------|--------------------------------|-----------------------|---|-----|--|--|--|---|--|--|--|--|--|----|
| | | | | Total [M €] | Ann. [M €] | | 0 | 1 | 2 | Year 1-6 | | | Year 7-12 | | | Years 13-18 | | | |
| | | | | | | | BAU | R | WFD | | | | | | | | | | |
| 1 | 88.2 | 23 | Regulate irrigation wells | 200 | 3 | | | | | | | | | | | | | | |
| 2 | 88.2 | 23 | Regulate river intake from | 4 | 3 | | | | | | | | | | | | | | |
| 3 | 85.5 | 428 | Green cover in orchards | 300 | 6 | | | | | | | | | | | | | | |
| 4 | 83.3 | 34 | Erosion structures | 7,000 | 18 | | | | | | | | | | | | | | |
| 5 | 83 | 421 | Upgrade irrigation schemes | 300 | 5 | | | | | | | | | | | | | | |
| 6 | 82.3 | 422 | Closure of illegal dumps | 250 | 6 | | | | | | | | | | | | | | |
| 7 | 82.2 | 419 | Upgrade industrial WWTP | 12 | 12 | | | | | | | | | | | | | | |
| 8 | 81.6 | 414a | Upgrade Erzen WWTP | 300 | 3 | | | | | | | | | | | | | | |
| 9 | 81.7 | 42 | Restorable fish ponds | 250 | 3 | | | | | | | | | | | | | | |
| 10 | 81.5 | 33 | Erosion control plans | 300 | 6 | | | | | | | | | | | | | | |
| 11 | 81.5 | 61 | Management plans Pila | 6 | 30cent | | | | | | | | | | | | | | |
| 12 | 81.3 | 411 | WWTP monitoring for Lake Prespa | 6 | 30cent | | | | | | | | | | | | | | |
| 13 | 80.9 | 414 | Enforcement of IPPC | 6 | 30cent | | | | | | | | | | | | | | |
| 14 | 59.8 | 424 | Educating farmers in good agricultural and environmental practice including composting of orchard waste | 180 | 2 | | | | | | | | | | | | | | |
| 15 | 59.7 | 21 | Preparation of flood risk and mitigation plans | 250 | 3 | | | | | | | | | | | | | | |
| 16 | 57.8 | 425 | Pilot project for environmental safe use of fertilizers and pesticides | 180 | 2 | | | | | | | | | | | | | | |
| 17 | 57.7 | 34 | Introduce drip irrigation systems on 4,000 ha | 4,000 | 4 + 4 | | | | | | | | | | | | | | |
| 18 | 55.4 | 22b | Construction of a dam on Chirinika River | 30,000 | 6 | | | | | | | | | | | | | | |
| 19 | 55.2 | 419b | Designate and monitor recreational areas | 40 | 30cent | | | | | | | | | | | | | | |
| 20 | 53.6 | 416 | Upgrade fisheries management based on source and catch assessment | 150 | 30cent | | | | | | | | | | | | | | |
| 21 | 53.7 | 25 | Develop a database on irrigation | 180 | 2 | | | | | | | | | | | | | | |
| 22 | 53 | 32 | Implement flood control measures | 5,000 | 12 | | | | | | | | | | | | | | |
| 23 | 53 | 414c | Construction of WWTP for smaller agglomerations (<2000 PE) | 2,000 | 13 | | | | | | | | | | | | | | |
| 24 | 52.6 | 43 | Establish inventory of private wells | 200 | 20cent | | | | | | | | | | | | | | |
| 25 | 52.2 | 427 | Upgrade farmer's capacity for proper hazardous waste disposal and use of pesticides | 50 | 4 | | | | | | | | | | | | | | |
| 26 | 51.8 | 56 | Train farmers in proper irrigation management | 30 | 1 | | | | | | | | | | | | | | |
| 27 | 50.8 | 54 | Improve management of priority substances | 60 | 2 | | | | | | | | | | | | | | |
| 28 | 50.5 | 415a | Improve sewage network in Resen and Zarnovce | 1,000 | 6 | | | | | | | | | | | | | | |
| 29 | 50 | 419c | Introduce regular monitoring of algae blooms | 40 | 30cent | | | | | | | | | | | | | | |
| 30 | 49 | 434 | Improve fertilizer management including capacity for laboratory analysis | 60 | 30cent | | | | | | | | | | | | | | |
| 31 | 48.8 | 420b | Introduce effective eutrophication strategies | 1,000 | 4 | | | | | | | | | | | | | | |
| 32 | 48 | 414b | Establish tertiary wastewater treatment in former fish ponds | 300 | 2 | | | | | | | | | | | | | | |
| 33 | 47.8 | 64 | Establish trans-boundary monitoring programme | 300 | 150 | 30cent | | | | | | | | | | | | | |
| 34 | 46.5 | 65 | Ensure harmonization of environmental data management | 25 | 1 | | | | | | | | | | | | | | |
| 35 | 46 | 420a | Improve existing and construct new sewage network in smaller agglomerations in the region | 2,500 | 14 | | | | | | | | | | | | | | |
| 36 | 45.5 | 65 | Pilot project for use of biomass as energy resource | 700 | 2 | | | | | | | | | | | | | | |
| 37 | 45.2 | 52 | Conduct detailed local hydro-geological investigations | 180 | 1 | | | | | | | | | | | | | | |
| 38 | 44.2 | 51 | Conduct regional hydro-geological investigations | 800 | 4 | | | | | | | | | | | | | | |
| 39 | 44 | 419d | Conduct a feasibility study on alternative eutrophication mitigation strategies | 60 | 1 | | | | | | | | | | | | | | |
| 40 | 38.3 | 55 | Conduct source investigations of priority substances in ground water | 30 | 1 | | | | | | | | | | | | | | |
| 41 | 37.8 | 418 | Conduct modeling of the effect of different discharge reduction strategies | 300 | 2 | | | | | | | | | | | | | | |
| 42 | 37.2 | 417 | Implement project for separation of storm water and construction of proper outfalls | 250 | 6 | | | | | | | | | | | | | | |
| 43 | 37.2 | 22a | Conduct a comprehensive feasibility study for improvement of management of water for | 1000 | 5 | | | | | | | | | | | | | | |



Thank You