National Academy of Sciences of Ukraine
International Institute for Applied Systems Analysis

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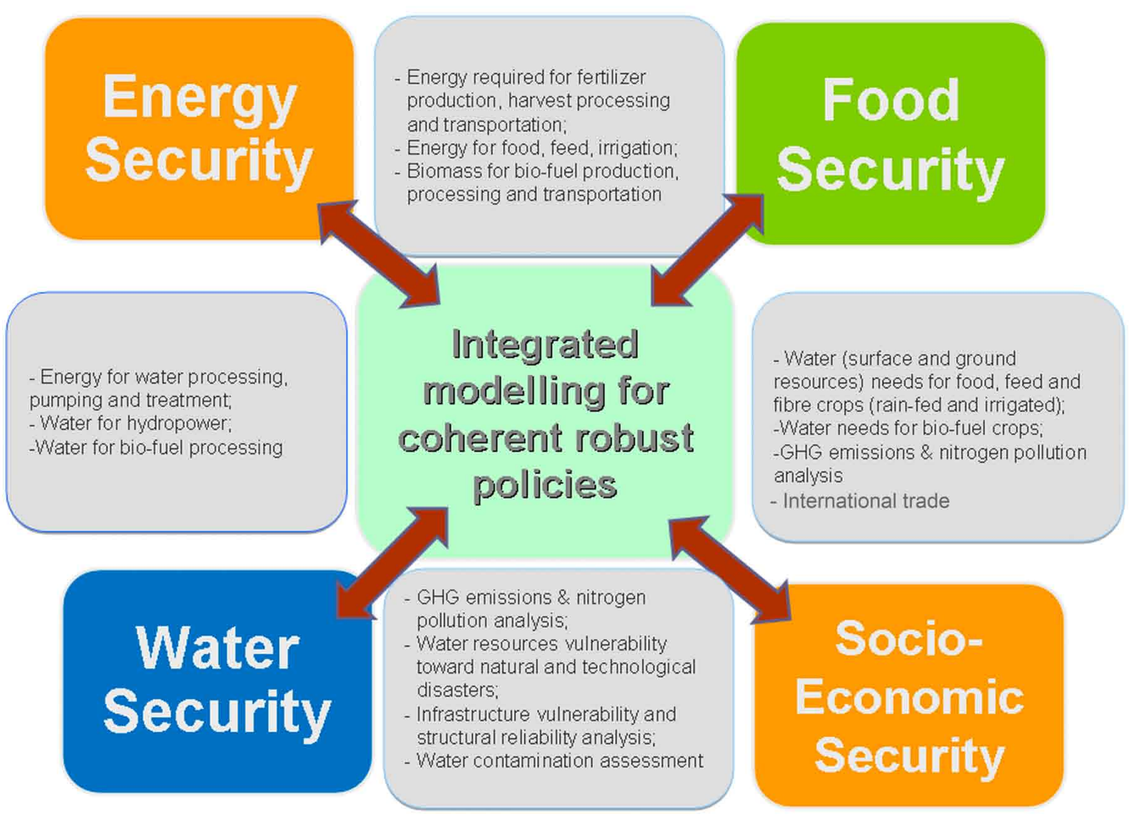
Integrated modeling of food, energy and water security management for sustainable social, economic and environmental developments

Project Purposes:

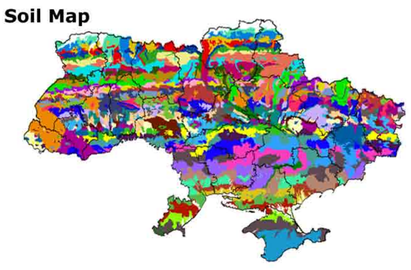
This activity aims to investigation of coordinated robust sustainable developments derived accounting for complex linkages and differences in spatial and temporal scales between agriculture, energy and water security, potential systemic risks and new coherent feasible policies at a country level taking into account interregional and international trades, global pollution, related risks, insurance markets, direct and indirect exchange of resources. In contrast to numerous existing isolated studies using different research principles and data treatments from diverse regions at different time intervals, this project focuses on new integrated multidisciplinary approaches by a research team from six non-profit institutes of the National Academy of Sciences, Ukraine, working in collaboration with International Institute of Systems Analysis.

The research developes a harmonized strategic approach for integrated modeling secure sustainable supply of food, energy and water under natural and human-related intentional and unintentional threats

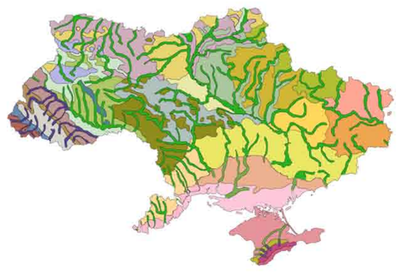
Integrated model of food, energy and water security under natural and human-related intentional and unintentional threats



Soil Map



Landscape Map



Energy use in agriculture

	2005	2007	2008	2009	2010
Electricity consumed by agriculture enterprises	2773.7	3096.7	2915.7	2927.9	3053.7
Total availability of power capacities in agriculture enterprises (end of year), mln. kW	46.2	41.1	39.7	38.3	36.7
Availability of power capacities in agriculture enterprises per 100 ha of sown area (end of year), kW	251	221	204	199	193

Water supply on agriculture land

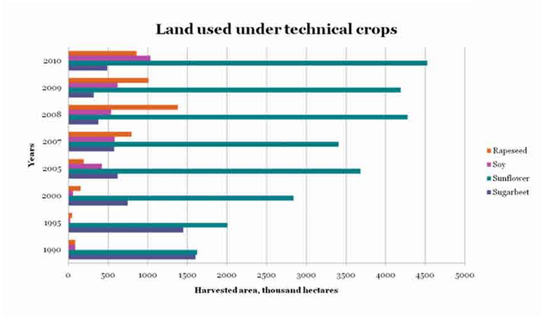
Irrigated land area

	1990	1995	2000	2005	2007	2008	2009	2010
Total area, thousand hectares	2598	2580	2402	2180	2177	2176	2175	2175
Land of agriculture enterprises	2598	2554	2198	1686	1641	1613	1574	1538
Share of irrigated land in agriculture land, %	6.2	6.2	5.7	5.2	5.2	5.2	5.2	5.2

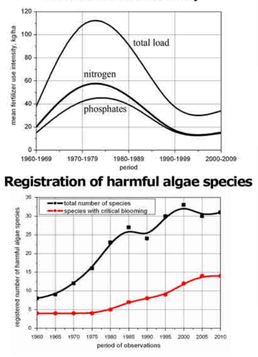
Drained land area

	1990	1995	2000	2005	2007	2008	2009	2010
Total area, thousand hectares	2857	2961	2961	2962	2959	2959	2959	2956
Land of agriculture enterprises	2826	2547	2042	1257	1057	1051	979	930
Share of drained land in agriculture land, %	6.8	7.1	7.1	7.1	7.1	7.1	7.1	7.1

Land used for biofuel crops



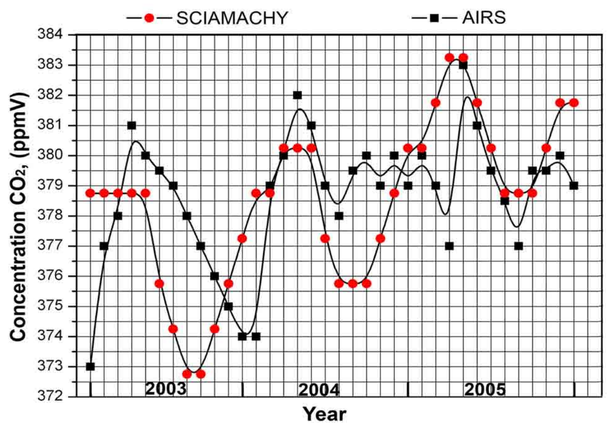
Water pollution analysis



Registration of harmful algae species

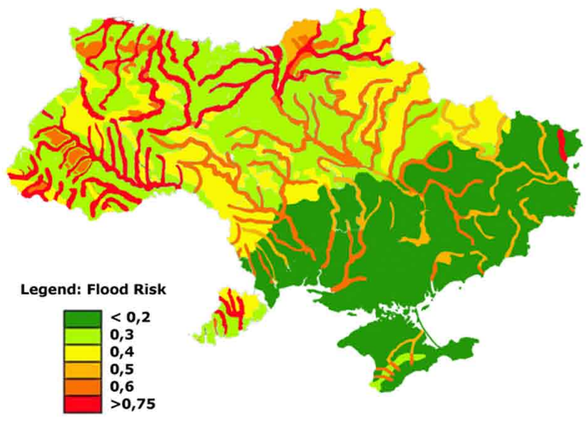
Climate change vulnerability analysis:

GHG atmospheric concentration estimation using satellite data



Natural disaster security:

Drought & flood risks management



Socio-ecological security:

Bio-productivity degradation risk