Geophysical Research Abstracts
Vol. 20, EGU2018-827, 2018
EGU General Assembly 2018

Application of the FAO Ex-ACT tool for carbon balance accounting in the agroecosystems of Tajikistan

Olga Golubeva, Murod Ergashev, and German Kust

Moscow Lomonosov State University, Soil Science, Soil Erosion and Conservation, Russian Federation (golubeva190@gmail.com)

Introduction. Many developing countries, whose economies are highly dependent on agriculture, choose the path of climate-smart land management (CSLM). Implementation of CSLM presents an opportunity for advancing climate change mitigation and adaptation, and ecosystem resilience in frame of the sustainable development. One of the criteria assessment of effective land management can be carbon balance (CB).
For decision-makings on the use of low-carbon (low emission) technology in the agricultural sector it is important to know their effectiveness and the overall carbon balance, taking into account the above-ground and below-ground carbon pools in the complex of interrelated activities of the agricultural cycle. The Ex-ACT modelling tool developed by FAO to assess the carbon balance, and is based on the 'estimated quantities' in agricultural and forestry projects (Bernoux et all., 2010; Ex-ante Carbon-balance Tool - Ex-ACT), was used in our study to assess the "low-emission" efficiency of small-scale CSLM activities within the project "Environmental land management and improving people livelihoods in rural areas" in Tajikistan.

The objectives of our study were: (a) using the criterion of "carbon-reduction" to conduct a comparative assessment of agricultural technologies and complex of economic activities potentially considered to be sustainable in different natural and socio-economic conditions of a particular country; (b) to evaluate the possibility of using the Ex-ACT method to assess the perspectives of the carbon balance control at the level of communities and small farmers.

Methodology and Objects. In total the Ex-ACT method was used for processing the information about 2300 local subprojects implementing in the rural area Tajikistan in 2014-2017.
Location. Six pilot regions in Tajikistan were selected with different climate, economic and socio-cultural conditions.

Results and Discussion. The general carbon balance (GCB) is about -265000 t-eq CO_2 per 20 years, i.e. in general for the project there is carbon sequestration. In different macro-regions and invested in the same technologies, take to account there different combinations we have different results in the carbon deposition: almost 60% of the effective carbon sequestration accounts for CSLM activities implemented in the highlands, primarily due to the micro-projects in horticulture and pasture management. It is almost 10 times higher than in the valleys with irrigated agriculture (6,3%). The most effective CSLM activities are the horticulture development (more than 34,07%), the rehabilitation of irrigation systems and canals - 18,4%, the perennial planting - 12,24%. The land protection and afforestation (5,68%) and the deforestation control (biofuel, solar panels) - 0,86% are not widely spread, therefore their contribution to the GCB is not significant. But there potential is very high, considering a value of average carbon balance per ha. It is about twice higher than horticulture development. And projects that promote GHG emissions (livestock and construction of new infrastructure) should be compensated for by low-emissions activities.

Conclusions.
The results suggest that the mathematical models underlying the method of Ex-ACT are able to adequately describe the carbon fluxes within different land-use types, and can used for the planning of environmentally effective activities in different biophysical conditions.