Green Grown- Bases of Bioeconomy Models in Correlation with Danubian Projects

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Abstract: The objective of the our study is to provide defined measureable indicators at the Romanian region level that to possibility over time transition to low carbon-economic and developed the bio-economic models in correlation with economic development in this areas. For implementing the global bio-economy models is important to develop the innovative research in cooperation with regional entrepreneur. In this context must to implementing the projects in cooperation with local authority, promoting common action to overcome the physical and socio-cultural barriers, and to better exploit the opportunities offered by the development of the cross-border area for a mid-long-term sustainable growth. In our research we developed one model using the series from water exploitation index (WEI), GDP per capita, CO2 emissions per capita (2emision) and population growth – POP.

Keywords: bio-economy; conservation; green growth

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Introduction

Accelerated destruction and degradation of ecosystems associated to wetlands, especially since the twentieth century, highlights the need to develop a legal framework and tools to stop this trend and determines the international community to take firm actions towards their recovery and conservation.

Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. The green growth development is the results the synergies and trade-offs between the environmental and economic pillars of sustainable development. To ensure sustainable development integrated environment and business, communities and economic welfare, we addressed key factors could be: integrating the principles of quality and innovation, total quality management, continuous improvement, excellence in business and organizational quality green and global policy advocacy and action plans with active measures for integrated environmental health, biodiversity for sustainable development in all areas of life. Green growth discards the traditional convention of "grow first, clean up later" and discourages investment decisions that entrench communities and countries in environmentally damaging, carbon-intensive systems[1]. Rather, it seeks to spur investment and innovation in ways that give rise to new, more sustainable sources of growth and development. Importantly, green growth does not neglect the social pillar; on the contrary, without good governance, transparency, and equity, no transformative growth strategy can succeed (Figure 1).

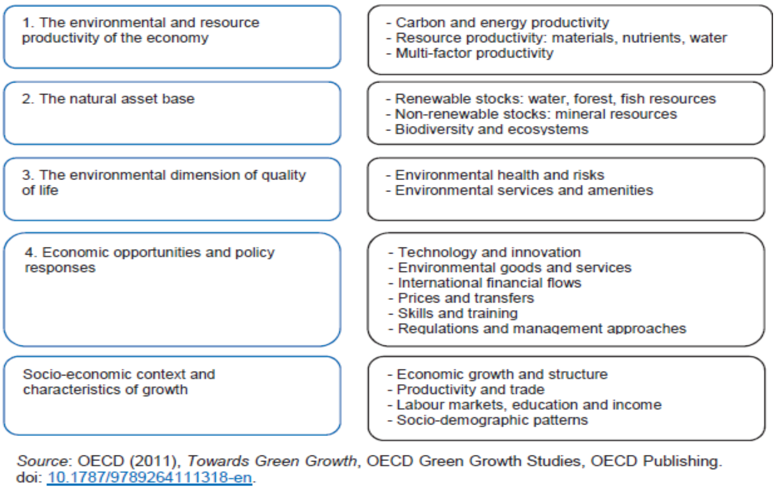


Figure 1. Green growth indicator groups and themes

[1] www.greengrowthknowledge

In the framework of the *EU 2020* Strategy for smart and green growth, the European Commission present the Communication "*Innovating for Sustainable Growth: a Bio-economy for Europe*". This Communication it is a Bio-economy Strategy and the Action Plan for promoting a more sustainable use of renewable biological resources within the European economy. The aim of the strategy is to ensure continued supply of safe and healthy food and feed, as well as for materials, energy, and other products (DGRTD, 2012). EU bio-economy is based to research, development and innovation, for uses the local biological renewable resources from land and sea. Interdependencies between socio-economic phenomena and diversity of the Danube territorial capital that occur in the context of regional sustainable development and identify viable solutions to insure the conservation of agro- biodiversity as part of natural and cultural heritage of the Danube Delta.

Material and Methods

The following example will be estimated and a regression equation to illustrate a model the water exploitation index (WEI) with use the series data of population in Romania date in period: 1990-2014. Series used:.-population (POP), since 1990 with the data source: www.insse.ro-Tempo-online database and GDP per capita, water exploitation index (WEI).-population (POP), and GDP per capita, CO2 emissions per capita (CO2emision) with the data sources GGKP data explorer. For a description of the analyzed phenomenon, we use the EViews program and we built a model of the form:

D(WEI)= C(1)*POP+ C(2)*CO2EMISION + C(3)*GDP+ +C(4)*T + C(5)*T^2 +C(6)

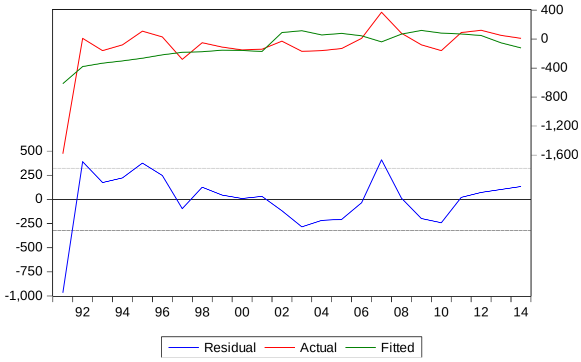
Dependent Variable: D(WEI)
Method: Least Squares
Date: 07/27/15 Time: 01:26
Sample (adjusted): 1991 2014
Included observations: 24 after adjustments
D(WEI)= C(1)*POP+ C(2)*CO2EMISION + C(3)*GDP+ +C(4)*T + C(5)
*T^2 +C(6)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.000484	0.000499	-0.969729	0.3450
C(2)	0.004063	0.214005	0.018985	0.9851
C(3)	-0.036163	0.080681	-0.448225	0.6593
C(4)	55.79459	58.46930	0.954254	0.3526
C(5)	-3.303451	2.063226	-1.601109	0.1268
C(6)	10524.55	11610.42	0.906474	0.3767

R-squared	0.305940	Mean dependent var	-100.0000
Adjusted R-squared	0.113146	S.D. dependent var	343.2200

S.E. of regression	323.2204	Akaike info criterion	14.60686
Sum squared resid	1880486.	Schwarz criterion	14.90138
Log likelihood	-169.2824	Hannan-Quinn criter.	14.68500
F-statistic	1.586872	Durbin-Watson stat	1.416283
Prob(F-statistic)	0.214155		

It is important to know the residual test of variable (Figure 2)



Estimation Command:
=========================
LS D(WEI)= C(1)*POP+ C(2)*CO2EMISION + C(3)*GDP+ +C(4)*T + C(5)*T^2 +C(6)
Estimation Equation:
=========================
D(WEI)= C(1)*POP+ C(2)*CO2EMISION + C(3)*GDP+ +C(4)*T + C(5)*T^2 +C(6)
Substituted Coefficients:
=========================
D(WEI)= -0.00048*POP+ 0.00401*CO2EMISION - 0.0361*GDP +55.7945*T - 3.3039*T^2 +10524

Figure 2. The residual test of variable

Results and Discussions

The Europe 2020 strategy calls for green growth based for bio-economy as a key element for smart and diversity of the Danube territorial capital in Europe. The green growth Strategy aim to pave the way towards a society more innovative, more efficient in terms of resource and competitive, which reconciles food security with the sustainable use of bio-resources renewable industrial purposes, ensuring at the same time, environmental protection.

In the model developed there is a direct relationship between water exploitation index (WEI), CO2 emissions per capita (CO2emision), and indirect relationship with population growth (POP), GDP /per capita.

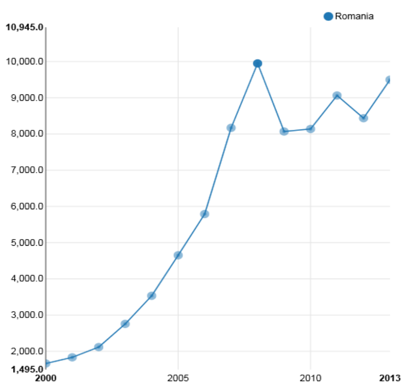


Figure 3. GDP for capita in Romania

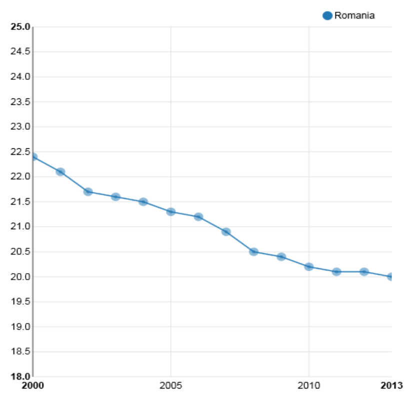


Figure 4. Population trend

For description the influence of the external factors we use the Dummy variable for correction the abnormal results, C(4)*T + C(5)*T^2.

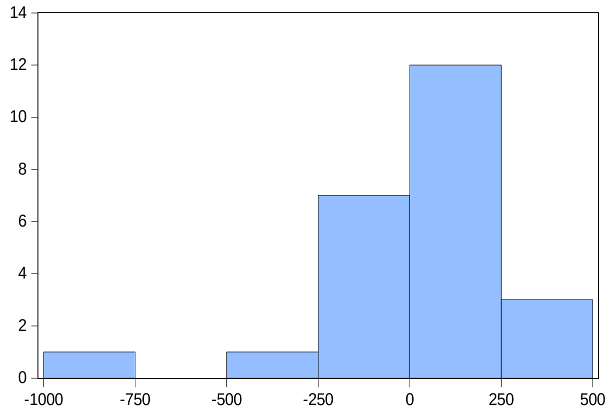
The coefficient of population growth (POP) from regression model it is very low $\hat{\beta}_1 =$ 0,0004 and standard error $SE(\hat{\beta}_1) =$ 0,0004, and statistic $\hat{t}_1 =$ 0.96, calculated: $\hat{t}_1 = \dfrac{\hat{\beta}_1}{SE(\hat{\beta})_1} = \dfrac{\text{Coefficient}}{\text{Std.Error}}$; valoarea p (*p value*) = 0.34, which shows that the population influencing the water exploitation index. The coefficient constant term in the regression model is = 3,30, standard error = 2,63, t-statistic = 0.90 expressed, with probability p value of 0.37. So the term is significant endorsement for the regression model chosen. Report of determination (R2- 0,30) shows the percentage is explained by the influence of significant factors. It is calculated as: use in assessing the quality of the model. It can take only values in the range [0,1]. The values are closer to the value 1, the model is better. The regression model is specified in this period we can say that growth can explain variation CO2 emissions per capita (CO2emision) with water exploitation index (WEI) consumption.

Were tested by the equation errors View / Residual tests / Correlogram - Q Correlogram of Residuals

Correlogram of D water exploitation index (WEI) consumption

Date: 07/27/15 Time: 01:30
Sample: 1991 2014
Included observations: 24

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	0.039	0.039	0.0415	0.839
. | . |	. | . |	2	-0.034	-0.036	0.0746	0.963
. *| . |	. *| . |	3	-0.098	-0.096	0.3602	0.948
. *| . |	. *| . |	4	-0.204	-0.200	1.6561	0.799
. *| . |	. *| . |	5	-0.120	-0.122	2.1313	0.831
. |* . |	. |* . |	6	0.150	0.137	2.9084	0.820
. | . |	. *| . |	7	-0.048	-0.105	2.9931	0.886
. *| . |	. *| . |	8	-0.112	-0.178	3.4842	0.900
. *| . |	. *| . |	9	-0.127	-0.170	4.1560	0.901
. *| . |	.**| . |	10	-0.199	-0.211	5.9267	0.821
. | . |	. *| . |	11	-0.041	-0.107	6.0057	0.873
. |* . |	. | . |	12	0.149	-0.014	7.1585	0.847



Series: Residuals	
Sample 1991 2014	
Observations 24	
Mean	7.22e-14
Median	25.60099
Maximum	409.4279
Minimum	-965.8120
Std. Dev.	285.9375
Skewness	-1.423587
Kurtosis	6.548630
Jarque-Bera	20.69918
Probability	0.000032

Estimation Command:
=========================
LS D(WEI)= C(1)*POP+ C(2)*CO2EMISION + C(3)*GDP+ +C(4)*T + C(5)*T^2 +C(6)

According to this test, for all lags of errors no serial correlation of errors (autocorrelation coefficient does not exceed the rated range in the chart). The existence of autocorrelation test is invalidated and the Q-statistic and the associated probability.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.023292	Prob. F(2,16)	0.9770
Obs*R-squared	0.069673	Prob. Chi-Square(2)	0.9658

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 07/27/15 Time: 01:32
Sample: 1991 2014
Included observations: 24
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.066-05	0.000546	-0.019339	0.9848
C(2)	-0.006356	0.228581	-0.027806	0.9782
C(3)	-0.000493	0.086619	-0.005690	0.9955
C(4)	-1.232930	63.08747	-0.019543	0.9846
C(5)	-0.023099	2.188230	-0.010556	0.9917
C(6)	281.8272	12728.44	0.022142	0.9826
RESID(-1)	0.042478	0.259564	0.163650	0.8721
RESID(-2)	-0.036334	0.256597	-0.141601	0.8892

R-squared	0.002903	Mean dependent var	7.22E-14
Adjusted R-squared	-0.433327	S.D. dependent var	285.9375
S.E. of regression	342.3291	Akaike info criterion	14.77062
Sum squared resid	1875027.	Schwarz criterion	15.16331
Log likelihood	-169.2475	Hannan-Quinn criter.	14.87480
F-statistic	0.006655	Durbin-Watson stat	1.500387
Prob(F-statistic)	1.000000		

Coefficient of the regression model is = 281 and statistic = 0, 98, shows that is a factor influencing the water exploitation index. Population coefficient is 1,066, standard error 0, 0005, and statistical = 0,019 with probability of 98% shows that is a factor influencing the water exploitation index. CO2emision coefficient is -0,006 standard error 0,228, and statistical = -0.027 shows that is a no important factor in influencing the water exploitation index. Theoretically with GDP growth should increase the water exploitation index, but up to a certain level.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.711688	Prob. F(4,19)	0.0610
Obs*R-squared	8.721955	Prob. Chi-Square(4)	0.0684
Scaled explained SS	13.61107	Prob. Chi-Square(4)	0.0086

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 07/27/15 Time: 01:32
Sample: 1991 2014
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2707919.	5250201.	-0.515774	0.6120
POP	0.097359	0.223629	0.435358	0.6682
CO2EMISION	125.3313	109.5696	1.143851	0.2669
GDP	42.89878	41.23862	1.040257	0.3113
T	-6731.176	28548.59	-0.235780	0.8161

R-squared	0.363415	Mean dependent var	78353.58
Adjusted R-squared	0.229397	S.D. dependent var	188535.6
S.E. of regression	165504.1	Akaike info criterion	27.05443
Sum squared resid	5.20E+11	Schwarz criterion	27.29986
Log likelihood	-319.6532	Hannan-Quinn criter.	27.11954
F-statistic	2.711688	Durbin-Watson stat	1.092200
Prob(F-statistic)	0.060987		

Conclusion

In our research we developed one model using the series from water exploitation index (WEI), GDP per capita, CO2 emissions per capita (co2emision) and population growth – POP. Theoretically with water exploitation index (WEI) GDP growth should increase the water exploitation index (WEI), but up to a certain level. The econometric model has shown that water exploitation index (WEI) growth with GDP and CO2 emission per capita index needs at the individual level is approximately constant, being influenced by specific biological factors and the water exploitation index is influenced with population growth and CO2 emissions.

In the context of climate change has become finding the innovative solutions to reduce the water exploitation index (WEI) and to develop the technologies and increase the share of agriculture in GDP value.

It is important to find viable solutions for the conservation and sustainable use of the resources of Danube region (soil, water, plant genetic resources, and animal genetic resources) in light of bio-resources supply.

It was necessary to develop the international projects in the Danube region for using the sustainable regional bio resources potential. .

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