

ASSESSMENT OF THE SOCIO-ENVIRONMENTAL CHALLENGES OF OIL AND GAS PRODUCTION IN THE NIGER-DELTA REGION OF NIGERIA

© 2015 NWOSU J. E.

UDC 504.5:622.323:502.14

Nwosu J. E. Assessment of the Socio-Environmental Challenges of Oil and Gas Production in the Niger-Delta Region of Nigeria

The Niger Delta region is made up of 9 out of the 36 states of Nigeria. The region is richly endowed with abundant natural resources and is one of the most biodiverse places on the planet comprising of four ecological zones namely: coastal barrier islands, mangrove swamps, freshwater swamps and lowland rainforests. Nigeria has a total of 159 oil fields and 1481 wells and produces a maximum capacity of about 2.5 million barrels per day as at 2014. These oil fields and well are all located within the Niger-delta region of the country. However, years of unsustainable exploration of oil and gas in this region have led to severe environment and social challenges among communities of this region. These include among others, degradation of the farm land, depletion of forest and aquatic fauna, pollution of air, groundwater and mangrove swamps. The long-term impacts of all these have posed serious health and social problems. Invariably, uncommon health problems have prevailed and the environment including the livelihood of the people of this region which are mainly farming and fishing have seriously been affected. This paper therefore is an attempt to assess the socio-environmental challenges that appear as a direct and indirect result of oil and gas exploration and production in the Niger-delta region of Nigeria. It draws a comparative analysis between Nigeria's Niger delta and some other oil producing African regions with the aim of bringing into perspectives the environmental and social impacts.

Keywords: socio-environmental impact, unsustainable crude oil exploration, oil spill, gas flaring, health problems, degradation and pollution.

Fig.: 5. **Tabl.:** 12. **Formulae:** 2. **Bibl.:** 25.

Nwosu Jonathan Emeka – Postgraduate student, Department of Management, Sumy State University (vul. Rymyskogo-Korsakova, 2, Sumy, 40007, Ukraine)
E-mail: emyjoesy@yahoo.com

УДК 504.5:622.323:502.14

Нвосу Д. Е. Оцінка соціо-екологічних проблем нафтогазової промисловості в дельті Нігеру в Нігерії

Регіон дельти Нігеру складають 9 із 36 штатів Нігерії. Цей регіон має багаті поклади природних ресурсів і є одним із найбільш біологічно різноманітних місць планети. Там розташовані чотири екологічні зони, а саме: прибережні бар'єрні острови, мангрові болота, прісноводні болота, низинні тропічні ліси. Усього в Нігерії 159 нафтових родовищ, 1481 нафтових свердловин, із максимальною видобувною потужністю близько 2,5 млн барелів за день (станом на 2014 р.). Усі ці родовища і свердловини розташовуються в дельті Нігеру. Однак роки нераціонального видобутку нафти і газу в регіоні призвели до серйозних екологічних і соціальних проблем серед населення. Серед них – виснаження сільськогосподарських земель, зникнення лісів і водної фауни, забруднення повітря, ґрунтових вод і мангрових боліт. Довгостроковий вплив вищевказаних факторів призвів до серйозних проблем у соціальній сфері і в сфері охорони здоров'я. Як наслідок, відбулося поширення рідкісних хвороб, а навколишнє середовище, включаючи джерела існування місцевого населення – землеробство і рибальство, зазнало значних ушкоджень. Ця стаття – спроба оцінити соціо-екологічні проблеми як прямий та непрямий результат розвідки і видобутку нафти і газу в дельті Нігеру в Нігерії. Робота містить порівняльний аналіз дельти Нігеру з деякими іншими нафтовидобувними регіонами Африки з метою вивести перспективи соціо-економічних наслідків.

Ключові слова: соціо-екологічний вплив, нераціональна розвідка нафти, витік нафти, спалювання попутного газу, проблеми у сфері охорони здоров'я, виснаження і забруднення.

Рис.: 5. **Табл.:** 12. **Формул:** 2. **Бібл.:** 25.

Нвосу Джонатан Емека – аспірант кафедри управління, Сумський державний університет (вул. Римського-Корсакова, 2, Суми, 40007, Україна)
E-mail: emyjoesy@yahoo.com

УДК 504.5:622.323:502.14

Нвосу Д. Э. Оценка соціо-екологических проблем нефтегазовой промышленности в дельте Нигера в Нигерии

Регион дельты Нигера составляют 9 из 36 штатов Нигерии. Этот регион располагает богатыми залежами природных ресурсов и является одним из наиболее биологически разнообразных мест планеты. Там расположены четыре экологические зоны, а именно: прибрежные барьерные острова, мангровые болота, пресноводные болота и низинные тропические леса. Всего в Нигерии 159 нефтяных месторождений, 1481 нефтяных скважин с максимальной производственной мощностью около 2,5 млн баррелей в день (по состоянию на 2014 г.). Все эти месторождения и скважины располагаются в дельте Нигера. Однако годы нерациональной добычи нефти и газа в регионе привели к серьезным экологическим и социальным проблемам среди населения области. Среди прочих – истощение сельскохозяйственных земель, исчезновение лесов и водной фауны, загрязнение воздуха, ґрунтовых вод и мангровых болот. Долгосрочное воздействие вышперечисленных факторов привело к серьезным проблемам в социальной сфере и в сфере здоровья. Так, распространились редкие болезни, а окружающая среда, включая источники существования местного населения – земледелие и рыболовство, ощутила значительные повреждения. Эта статья – попытка оценить соціо-екологические проблемы как прямой и косвенный результат разведки и добычи нефти и газа в дельте Нигера в Нигерии. В работе содержится сравнительный анализ дельты Нигера с некоторыми другими нефтедобывающими регионами Африки с целью вывести перспективы соціо-екологических последствий.

Ключевые слова: соціо-екологическое воздействие, нерациональная добыча нефти, утечка нефти, сжигание попутного газа, проблемы в области здравоохранения, истощение и загрязнение.

Рис.: 5. **Табл.:** 12. **Формул:** 2. **Библ.:** 25.

Нвосу Джонатан Эмека – аспирант кафедры управления, Сумской государственной университет (ул. Римского-Корсакова, 2, Сумы, 40007, Украина)

E-mail: emyjoesy@yahoo.com

INTRODUCTION: GAINS OF OIL AND GAS PRODUCTION

Crude oil was discovered in the Niger-delta region in 1956 and by 1958, Nigeria had commenced commercial production of Oil and Gas. Today, Niger delta region has made Nigeria the largest oil producer in Africa and ranked 10th in the world, with a proven crude oil reserve of about 37

billion barrels. The natural gas reserves which is four times bigger than the oil reserves, account for 5.2 trillion cubic meters, making Nigeria the world's 7th biggest gas resource and contributing 10% of world's international liquid natural gas supply. These resources located within this region have contributed hugely to the development and growth of Nigerian economy. For instance, oil and gas sector accounts

for about 14% of gross domestic product. Petroleum exports revenue represents about 90% of total exports revenue, 65% of government budgetary revenues and finances about 80% of the national budget. A comparison of oil and non-oil tax revenue and the revenue percentage of gross domestic product (GDP) prove the point (fig. 1, fig. 2).

Figure 1 above is a comparison of revenue taxes from oil and non-oil sectors in Nigeria from 2010 to 2013. The result shows that oil revenue earned more into the federation account all through the years under consideration. Similarly, figure 2 compares oil revenue percentage of GDP and non-oil revenue percentage of GDP. Again, the result is obvious –

Oil revenue percentages of GDP of the years under review were quite higher than non-oil revenue percentages.

Over the years oil and gas production has become the mainstay of Nigerian economy as their earnings are used for infrastructural development as well as advancing the growth of the economy. The contribution of oil and gas to the economy was the basis of IMF projected growth of Nigerian economy [3]. Today, Nigeria is said to be one of the fastest growing economies. The 2013 rebasing of the economy saw Nigeria emerge as the largest economy in Africa. The oil and gas multinational companies have to an extent created employment and engaged in some developmental projects and provision of basic amenities to the host communities.

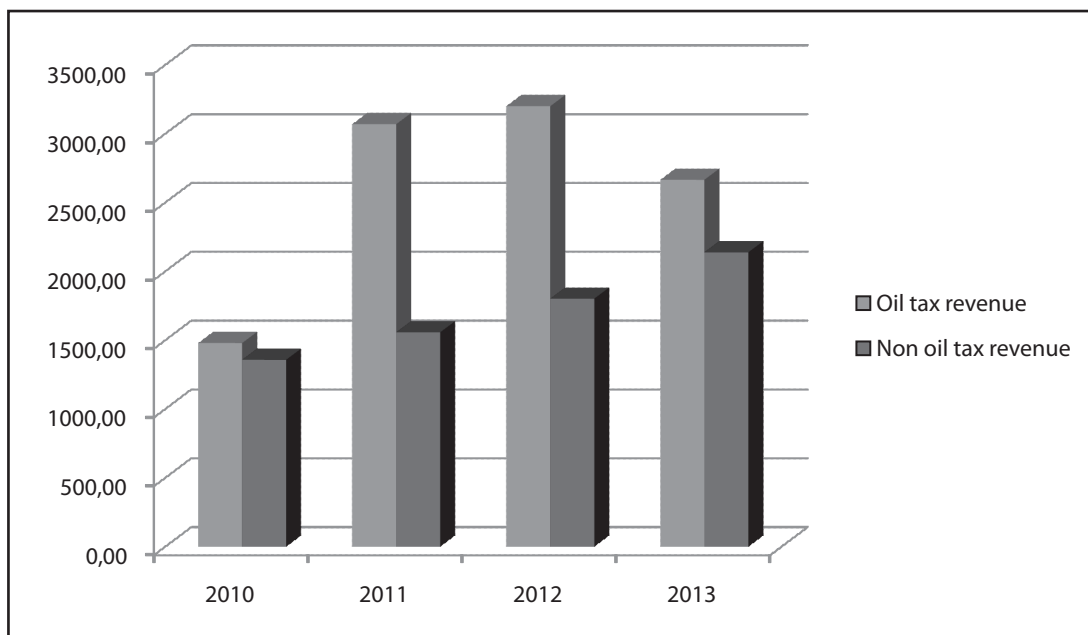


Fig. 1. Comparison of Oil Tax Revenue with Non-Oil Tax Revenue 2010–2013

Source: Nwaru C. K., 2014 [1].

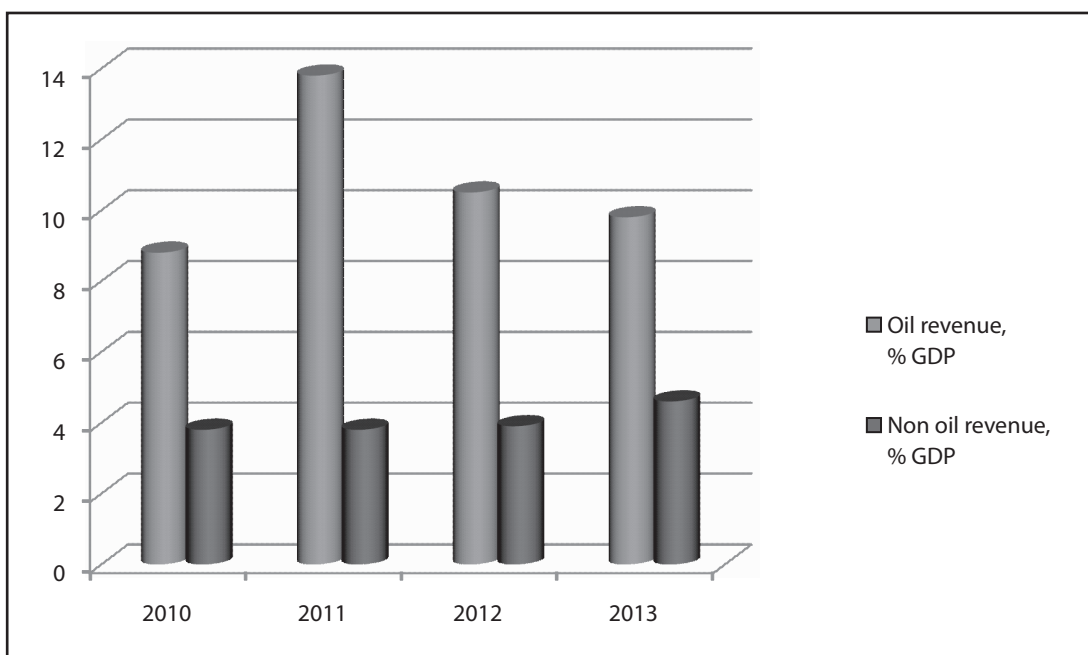


Fig. 2. Nigeria's Revenue, % of GDP (after rebasing)

Source: Cobham A., 2014 [2].

SOCIO-ENVIRONMENTAL IMPACTS

As much as oil and gas production have accelerated the growth of Nigerian economy and remains the highest source of the nation's revenue, its unsustainable exploration has much more triggered adverse socio-environmental impacts on this region that has a population estimate of over 20 million with about 40 ethnic groups. Not only are there incessant environmental degradation which have accumulated over the years due to limited scrutiny and lack of assessment, but also the livelihood and health of host communities of this region have been adversely affected. Below is a model to determine the structure of socio-environmental damage due to oil exploration (fig. 3).

The figure above shows the socio-environmental impacts of unsustainable oil exploration and production in the Niger-delta which in turn attracts a multiplier effects on the environmental and social life of the region and host communities.

The Niger-delta economy is predominantly an agro centered economy with farming and fishing as the main source of livelihood. This is because the ecosystem of the area is highly diverse, rich in biodiversity with arable and cultivable land supportive of numerous species of terrestrial and aquatic flora and fauna [4]. The area is covered by the natural delta of the Niger River with mangrove swamps, fresh water swamps and lowland rain forest. This region is massively endowed with material and natural resources hence the larger number of the population depended on these resources and the environment for livelihood (fig. 4).

Figure 4 shows the distribution of the working population by their activities in the Niger-delta. 48% of the working population is involved in agriculture (farming/fishing) and 20% engaged in trading. 9%, 7%, 5%, 4%, 3%, 2% are engaged in services, education/health, public administration, transport, manufacturing and construction sectors respectively while 2% is employed in other minor sectors. Almost

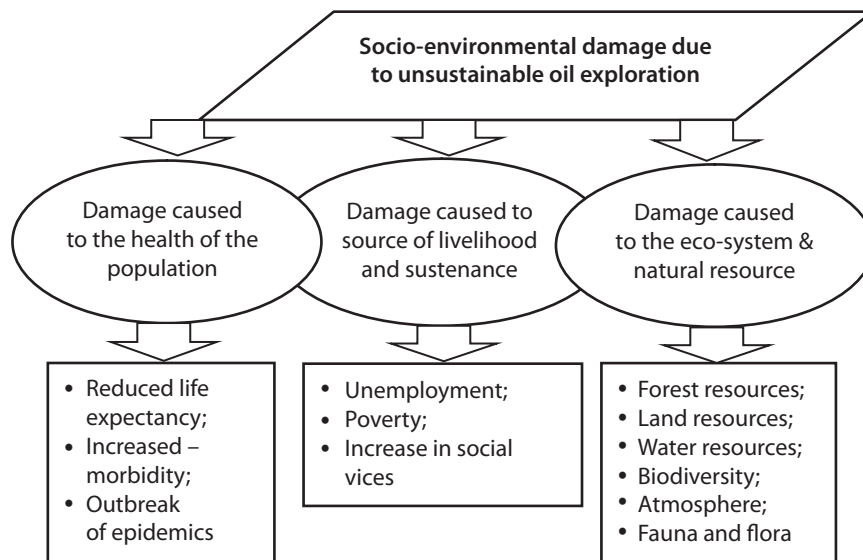


Fig. 3. Structure model of socio-environmental damage due to oil exploration and production.

Source: Author, 2015.

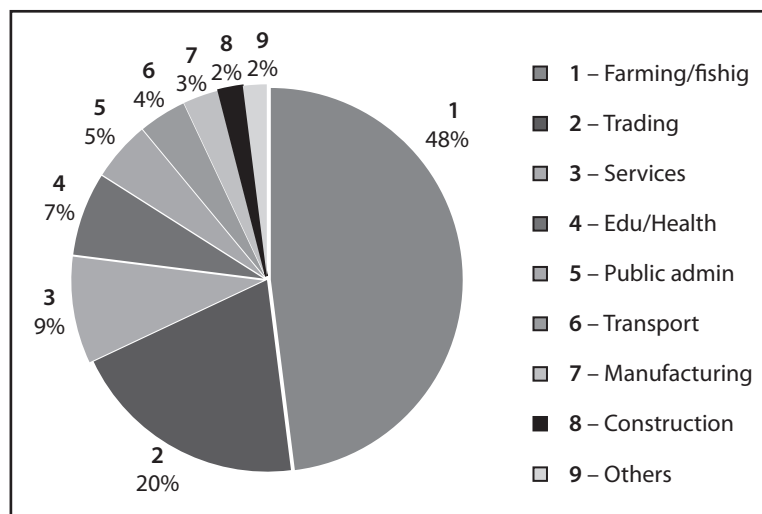


Fig. 4. Distribution of working population by activities in Niger-delta

Source: Paul Francis, 2008 [5].

half of the working population of this region is engaged in Agriculture which thrives in an enabling environment. It is obvious from this distribution that anything that affects the environment upon which farming and fishing thrive in this region affects not only the people but their major source of livelihood. This is exactly the dilemma oil and gas exploration and production posed in this region.

The main Challenges associated with oil exploration and production in the Niger-delta include oil spillage and gas flaring. These two have made far reaching impacts on the environment and lives of the people of this region.

OIL SPILLAGE

Oil spill is the major source of socio-environmental problems in the Niger-delta. Oil spill is the release of liquid petroleum hydrocarbon into the environment, ocean or coastal waters due to human activity [6]. It includes releases of crude oil from tankers, offshore platforms, drilling rigs and wells, as well as spills of refined petroleum products (such as gasoline, diesel) and their by-products, and heavier fuels used by large ships such as bunker fuel, or the spill of any oily refuse or waste oil [7]. Nwilo and Badejo [8], summarized it as the uncontrolled discharge of oil or its by-products including chemicals and wastes, which mainly occurs through equipment failure, operation error or willful damage. Oil spill affects the society and environment in diverse ways.

Osuji and Onojake, identified the following as some of the consequences of oil spillage in the Niger Delta Region of Nigeria.

- i. Damage to the fragile mangrove forest.
- ii. Threatening of rare species including primates, fish, turtles and birds.
- iii. Destruction of the livelihoods of many of the 20 million people living the region.
- iv. Reducing the fertility of the soil.
- v. Increase cost of living.
- vi. Increasing poverty.
- vii. Poor health status.
- viii. Reduced life expectancy which is estimated at 41 years.
- ix. Fuelling the upsurge of violence and social vices.

Niger delta region has witnessed a consistent spill of oil in thousands of barrels from year to year since the start of crude oil exploration. Millions of barrels of oil which have been spilled into the environment were yet to be cleaned up thereby posing threat to the environment and lives of the people. Is a *table 1* of oil spill in Niger delta.

The table shows a 20 years record of barrels of oil spilled in the Niger-delta region from 1995 to 2014 and the number of times it occurred in a year. It was estimated that about 546 million gallons of oil have poured into the ecosystems of the Niger Delta over 50 years of oil production [10] and had occurred more than 16,910 times between 1976 and 2014 [9]. On the contrary, only 10 spills were reported across all of Europe between 1971 and 2011."In any other country, Nigeria's spill figures would be a national emergency, but in Nigeria it appears to be standard operating procedure for the oil industry" [11]. In fact, the society, ecology and ecosystem of the Niger-delta has been devastated as

oil spills destroy vegetation, mangrove forests, food/cash crops, fishing ground/marine life, reduce nutrient value of the soil, induce land fragmentation, and, in isolated cases, set communities on fire [12]. Invariably, cultivable land and soil fertility in this region are continuously lost due to oil spills and land degradation thus affecting the farm product and income of the people. The depletion of biodiversity and forest resources, decline in productivity; aquatic body and water pollution, health hazards are all linked one way or the other to oil spill.

Table 1

20 Years Spill Data –1995 to 2014

Year	No. of Spills	Qty. spilled (barrels)
1995	417	63677.17
1996	435	46353.12
1997	339	81727.85
1998	399	99885.35
1999	225	16903.96
2000	637	84071.91
2001	412	120976.16
2002	446	241617.55
2003	609	35284.43
2004	543	17104.00
2005	496	10734.59
2006	461	13772.92
2007	482	10848.00
2008	740	49524.80
2009	849	43648.82
2010	537	17658.10
2011	582	28210.95
2012	871	15552.18
2013	988	14783.53
2014	553	25000.00

Source : Ekwugha U. E., 2014 [9].

GAS FLARING

Gas flaring and venting is associated with crude oil exploration and production. Gas flaring is the burning of natural gas that is associated with crude oil when it is pumped up from the ground. Nigeria flares approximately 13 bcm annually making her the second largest gas flaring country after Russia. Ajugwo [13], put it at about 17.2 billion m3 of natural gas flared per year in conjunction with the exploration of crude oil in the Niger Delta. One of the strong reasons for gas flaring by oil companies is to maximize profit from oil production. It is more economical for the oil companies to burn off the gas and pay less fee than to re-inject the gas in the oil well. This monetary gain drive has overshadowed the adverse effects produced by this action. The environment and human health have frequently been a secondary consideration to these companies. Some socio-environmental implications of gas flaring according to Ajugwo include:

- i. Acidic rain.
- ii. Climate change.
- iii. Lose of vegetation and agricultural produce.
- iv. Health and Hematological Effects.
- v. Pollution.

Acidic rain which falls as the result of emission of sulfuric acid and nitric acid that combine with atmospheric moisture, acidify lakes, streams and damages vegetation. It accelerates the decay of building materials, contributes to visibility degradation and harms public health. Gas flaring brings about climate change by the emission of greenhouse gases which contributes to global warming. There is usually no vegetation miles away from flared site due to tremendous heat and acidification hence agricultural lands and crops are permanently destroyed. Adverse health impacts, such as cancer, Deformities in children, neurological, reproductive effects, lung damage, skin problems and blood related issues are prevalent in communities close to flare sites. This is said to be as a result of hazardous air pollutant. Emissions from gas flaring include carbon dioxide, methane, sulphur dioxide, nitrogen dioxides, carcinogenic substances such as benz[a]pyrene and dioxin, and unburned fuel components, including benzene, toluene, xylene, and hydrogen sulphide [14].

Gas flaring continues to be a common practice in the Niger delta. Many flares have run 24 hours a day and some have been active for 40 years with over 8 million cubic feet per day burnt [15] (table 2).

Nigeria has about 123 gas flaring sites which has been burning over five decades [17]. According to UNEP [18], burning of waste gas from these sites that discharge about 45.8 billion kilo watts of heat into the atmosphere is visible from space and particularly remains problematic because of the 'open pipe flare' adopted in Nigeria which has grown obsolete. The World Bank [19] global estimate shows that annual flared volume from satellite data is 134 billion cubic meters (bcm) of which Nigeria accounts for 15.2 bcm, making for 11.34% of the global flare rate. According to a field survey, gas flared 1kilometers away from a farm settlement affects 10% of the output, vegetation and biodiversity. When it is 600 meters away, it has a 45% effect on output and when it is 200 meters, it has a 100% effect [20].

Studies have proved that there are diverse health implications as a result of oil spill and gas flaring in host communities. In a research study carried out in one of the Niger delta states, Ordinioha and Sawyer revealed the differences in health symptoms in oil and non-oil communities (table 3).

The table 3 shows a big difference in communities where crude oil are explored and produced, and communities where no exploration takes place. It is so obvious that in all the variables, the oil communities have much more higher symptoms of health problems than the non-oil communities. Other effects of oil induced health issues include increased risk of respiratory diseases, asthma, cancerence oil and gas pollution contain heat, toxins and particulates that adversely affect human being, vegetation, soil, and the entire livelihood of people. It is not an assumption that the three main source

Table 2

Gas flare data in Niger delta 1994–2014

Year	Gas Produced	Gas Utilized	Gas Flared	% Flared
1995	35,100	8,114	26,986	–
1996	35,450	8,860	26,590	–
1997	37,150	10,383	24,234	–
1998	37,039	13,407	23,632	–
1999	43,636	21,274	22,362	–
2000	42,732	18,477	24,255	–
2001	52,453	25,702	26,759	–
2002	1,651,591,48	897,789,582	753,801,906	45.64
2003	1,828,541,855	983,562,969	844,978,886	46.21
2004	2,082,283,189	1,195,742,993	886,540,196	42.58
2005	2,093,628,859	1,282,313,082	811,315,777	38.75
2006	2,182,432,084	1,378,770,26	803,661,823	36.82
2007	2,415,649,041	1,655,960,315	759,688,726	31.45
2008	2,287,547,344	1,668,148,489	619,398,854	27.08
2009	1,837,278,30	1,327,926,402	509,351,905	27.72
2010	2,392,838,898	1,811,270,545	581,568,354	24.30
2011	2,400,402,880	1,781,370,022	619,032,858	25.79
2012	2,580,165,626	1,991,498,902	588,666,724	22.82
2013	2,325,137,449	1,916,531,001	409,311,430	17.60
2014	2,524,268,44	2,234,668,430	289,600,014	11.47

Source: NNPC Annual Statistical Bulletin 2002, 2012, 2014 [16].

of life – air, water and food are often contaminated in this oil region. All these have contributed to premature death and other negative health conditions. Moreso, high rate of unemployment and poverty among the people of this region whose sources of livelihood are dominantly dependent on their environment and natural gifts is linked to oil exploration.

Table 3

Percentage of health symptoms reported in oil exposed and non-exposed communities

Variables	Exposed community, %	Unexposed community, %
Malaise	23.33	15.77
Headache	36.19	12.86
Nausea	22.86	5.24
Diarrhea	41.43	13.33
Sore eyes	32.86	4.29
Sore throat	30	6.19
Cough	26.67	8.1
Itchy skin	42.86	6.67
Rashes	24.29	5.71

Source: Ordinioha and Sawyer, 2010 [21].

COMPARATIVE ANALYSIS

The Niger-delta is blessed with abundant natural resources including crude oil. However, the exploration and

production of this oil has degraded if not destroyed the nature's gifts of the people and has negatively impacted the environment. It paradoxical to say that a region that was once rich and blessed with natural and environmental resources now suffers from such blessing. Perhaps, no other oil producing region of the world has suffered so much from their nature given resources like the Niger-delta region. We shall make a comparative analysis with other oil producing sub-Saharan Africa regions using some socio-environmental indexes in other to determine the extent of effect of crude oil exploration and production in the Niger delta region (table 4 – table 8).

$$Ave = \frac{R_1 + R_2 R_3 + R_4 + R_5 + R_6}{6},$$

$$Rating = \sum \frac{Rv}{Ave},$$

where: R_1 – Region Nigeria (Niger delta);
 R_2 – Region Angola;
 R_3 – Region Cameroon;
 R_4 – Region Ghana;
 R_5 – Region South Africa;
 R_6 – Region Congo;
 Rv – Real Value;
 Ave – Average.

The tables show five years comparism of some socio-environmental indices of six oil producing sub-Saharan African regions namely Angola, Cameroon, Ghana, South

Table 4

2010 Selected Socio-Environmental Indices of Oil Producing Sub-Saharan African Regions

Region	Life Expectancy, I_{le}		Mortality Rate, I_{mr}		Gas Flaring (%), I_{gf}		Oil Spill (mb), I_{os}	
	real value rating		real value rating		real value rating		real value rating	
Nigeria (N. delta)	46	0.86	32	2.04	24.30	3.72	17658.10	5.35
Angola	51	0.95	15	0.96	4.31	0.66	2,100	0.36
Cameroon	54	1.00	13	0.83	8.50	1.30	11	0.00
Ghana	61	1.13	9	0.57	0.49	0.07	0	0.00
South Africa	54	1.00	14	0.89	0.56	0.01	13	0.00
Congo	57	1.06	11	0.70	1.08	0.17	10	0.00
Average	53.8		15.7		6.54		3298.7	

Table 5

2011 Selected Socio-Environmental Indices for Oil Producing Sub-Saharan African Countries

Region	Life Expectancy, I_{le}		Mortality Rate, I_{mr}		Gas Flaring (%), I_{gf}		Oil Spill (mb), I_{os}	
	real value rating		real value rating		real value rating		real value rating	
Nigeria (N. delta)	47	0.87	30	1.97	25.79	4.32	28210.95	5.48
Angola	51	0.94	15	0.99	5.94	0.97	1,900	0.37
Cameroon	54	0.99	12	0.79	1.19	0.20	96	0.00
Ghana	61	1.12	9	0.59	0.68	0.11	706	0.13
South Africa	55	1.02	14	0.92	0.13	0.02	0	0.02
Congo	58	1.07	11	0.72	2.02	0.34	0	0.00
Average	54.3		15.2		5.96		5152.2	

Table 6

2012 Selected Socio-Environmental Indices for Oil Producing Sub-Saharan African Countries

Region	Life Expectancy, I_{le} real value rating		Mortality Rate, I_{mr} real value rating		Gas Flaring (%), I_{gf} real value rating		Oil Spill (mb), I_{os} real value rating	
	Nigeria (N. delta)	48	0.87	28	1.96	22.82	4.39	15552.18
Angola	51	0.93	13	0.91	4.72	0.91	1500	0.51
Cameroon	55	1.00	13	0.91	0.97	0.19	0	0.00
Ghana	61	1.11	9	0.63	0.59	0.11	0	0.00
South Africa	56	1.02	13	0.91	0.34	0.02	209	0.07
Congo	58	1.06	10	0.70	1.79	0.34	315	0.11
Average	54.8		14.3		5.2		2,929.3	

Table 7

2013 Selected Socio-Environmental Indices for Oil Producing Sub-Saharan African Countries

Region	Life Expectancy, I_{le} real value rating		Mortality Rate, I_{mr} real value rating		Gas Flaring (%), I_{gf} real value rating		Oil Spill (mb), I_{os} real value rating	
	Nigeria (N. delta)	49	0.88	26	1.88	17.60	3.96	14783.53
Angola	52	0.94	13	0.94	4.08	0.92	1200	0.44
Cameroon	55	0.99	12	0.87	0.92	0.21	0	0.00
Ghana	61	1.10	9	0.65	1.74	0.39	40	0.01
South Africa	57	1.03	13	0.94	0.42	0.09	0	0.00
Congo	59	1.06	10	0.72	1.88	0.42	468	0.17
Average	55.5		13.8		4.44		2,748.6	

Table 8

2014 Selected Socio-Environmental Indices for Oil Producing Sub-Saharan African Countries

Region	Life Expectancy, I_{le} real value rating		Mortality Rate, I_{mr} real value rating		Gas Flaring (%), I_{gf} real value rating		Oil Spill (mb), I_{os} real value rating	
	Nigeria (N. delta)	50	0.90	24	1.78	11.47	3.27	25000.00
Angola	52	0.93	13	0.96	4.78	1.36	700	0.16
Cameroon	55	0.99	12	0.89	0.88	0.25	200	0.04
Ghana	61	1.10	9	0.67	1.70	0.48	0	0.00
South Africa	57	1.02	13	0.96	0.60	0.17	220	0.05
Congo	59	1.06	10	0.74	1.6	0.45	0	0.00
Average	55.7		13.5		3.51		4,436.7	

Source: Telizhenko & Shvindina [22].

Africa, Congo Republic and Nigeria's Niger-delta with the rating of the indices of each region based on real values. However, for a better analysis, the aggregate value of each index would be presented (table 9 – table 12).

$$I_{sen} = \sum_{ny5}^{rat5} \left(I_{agrat5} = \frac{Srat}{Iny} \right),$$

where: I_{sen} – index of socio-environment;
 I_{agrat} – index of aggregate rating;
 Iny – index of total number of years;
 $Srat$ – sum total of index rate;
 I_{le} – index of life expectancy;

I_{mr} – index of mortality rate;
 I_{gf} – index of gas flaring;
 I_{os} – index of oil spills.

RESULT AND CONCLUSION

The figure shows that Nigeria's Niger delta scored the lowest point in Life Expectancy index – 0.88 for the years under review, while Angola, Cameroon, South Africa and Congo Rep. scored 0.94, 0.99, 1.02, and 1.06 respectively. Ghana had the highest point – 1.11. The index of Mortality Rate saw Nigeria's Niger delta having the highest point with 1.93 while Angola, Cameroon, Ghana, South Africa

Table 9

Life Expectancy

<i>I_{le}</i> aggregate rating for selected countries						
Year	Nigeria (Nd)	Angola	Cameroon	Ghana	South Africa	Congo
2010	0.86	0.95	1.00	1.13	1.00	1.07
2011	0.87	0.94	0.99	1.12	1.02	1.06
2012	0.87	0.93	1.00	1.11	1.02	1.06
2013	0.88	0.94	0.99	1.10	1.03	1.06
2014	0.90	0.93	0.99	1.10	1.02	1.06
Agr. rate	0.88	0.94	0.99	1.11	1.02	1.06

Table 10

Mortality Rate

<i>I_{mr}</i> aggregate rating for selected countries						
Year	Nigeria (Nd)	Angola	Cameroon	Ghana	South Africa	Congo
2010	2.04	0.96	0.83	0.57	0.89	0.70
2011	1.97	0.99	0.79	0.59	0.92	0.72
2012	1.96	0.91	0.91	0.63	0.91	0.70
2013	1.88	0.94	0.87	0.65	0.94	0.72
2014	1.78	0.96	0.89	0.67	0.96	0.74
Agr. rate	1.93	0.95	0.86	0.62	0.92	0.72

Table 11

Gas Flaring

<i>I_{gf}</i> aggregate rating for selected countries						
Year	Nigeria (Nd)	Angola	Cameroon	Ghana	South Africa	Congo
2010	3.72	0.66	1.30	0.07	0.01	0.17
2011	4.32	0.97	0.20	0.11	0.02	0.34
2012	4.39	0.91	0.19	0.11	0.02	0.34
2013	3.96	0.92	0.21	0.39	0.09	0.42
2014	3.27	1.36	0.25	0.48	0.17	0.45
Agr. rate	3.93	0.96	0.43	0.23	0.06	0.34

Table 12

Oil Spill

<i>I_{os}</i> aggregate rating for selected countries						
Year	Nigeria (Nd)	Angola	Cameroon	Ghana	South Africa	Congo
2010	5.35	0.36	0.00	0.00	0.00	0.00
2011	5.48	0.37	0.00	0.13	0.02	0.00
2012	5.30	0.51	0.00	0.00	0.07	0.11
2013	5.38	0.44	0.00	0.01	0.00	0.17
2014	5.63	0.16	0.04	0.00	0.05	0.00
Agr. rate	5.43	0.37	0.01	0.03	0.03	0.06

and Congo Rep scored 0.95, 0.86, 0.62, 0.92, and 0.72 respectively. Similarly Niger delta had the highest point in the Gas Flaring index 3.93 and other regions in the same order scored 0.95, 0.43, 0.23, 0.06, and 0.34 respectively. These entire regions combine together had a total of 2.02. In the Oil Spill index, Nigeria's Niger delta scored 5.43 while other

countries according to the order scored 0.37, 0.01, 0.03, 0.03, and 0.06 respectively. Niger delta's score is 5 times higher than all the other five regions combined with a total of 0.5.

The reason for the low life expectancy score and high mortality rate in the Niger delta region could not be divorce from high rate of gas flaring and oil spill in the re-

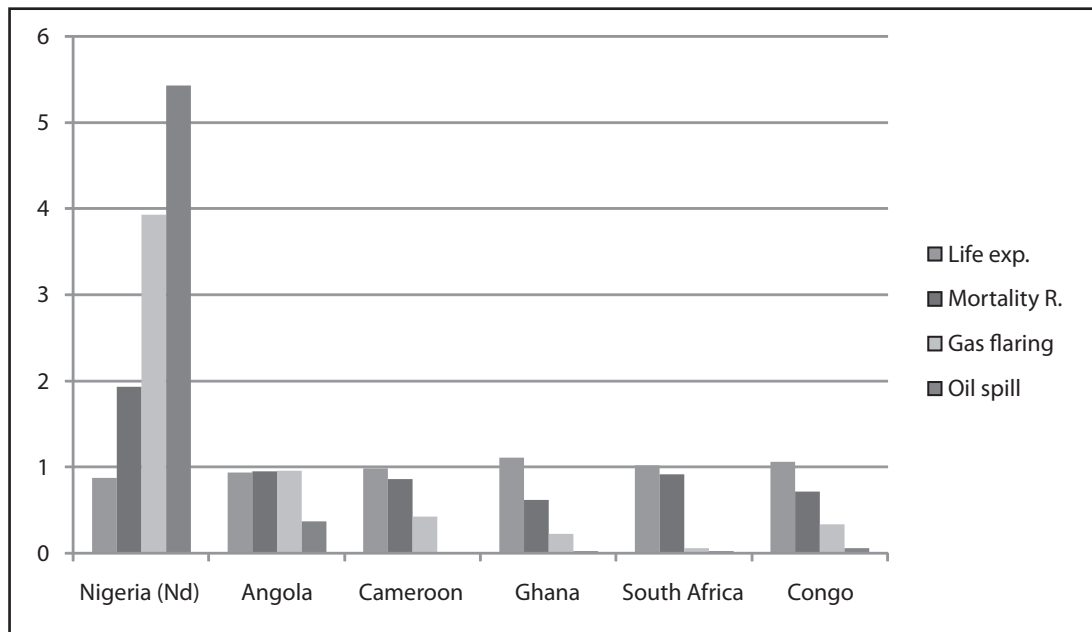


Fig. 5. Aggregate rating of some socio-environmental indices of sub-Saharan oil producing African regions for the years under review

gion. Oil spills and gas flaring are said to constitute health hazards to the host communities and has been identified as the reason for the prevalence of certain sickness among the oil-producing communities. This health issues are slow and covert and thus makes it difficult to fully understand its contribution to the disease burden in the oil-bearing communities [23]. You can imagine the condition where 123 active gas flare sites in Nigeria are all located in this region and some of these sites are said to be of closer proximity to residential areas and their agricultural land. The effects is increased risk of respiratory diseases, asthma, cancer and premature death hence flares contain heat, toxins and particulates that adversely affect human, vegetation, soil, water and the entire livelihoods of the host communities. Oil spill often contaminates food and water sources and pollutes the entire environment. Furthermore, the depletion of natural resources and the degradation of the environment upon which the means of livelihood of the local people are sustained have left a larger percentage of the people without any job or means of livelihood. The resultant effect is high rate of unemployment and the attendant poverty. This is as a result of the unsustainable pattern of exploration employed by the multi-national oil companies and the failure of the Nigerian government to put up effective regulatory policies. Citing an example of this, Bjorn Hamso [24] "Nigeria has had a policy of no flaring since 1984, but its enforcement of this policy has been weak. In some ways it's another case of the resource curse where countries rich in natural resources struggle with managing them efficiently". The existence of multinational oil Corporations in this region is yet to show any sign of true socio-environmental development rather, they exist to maximize profit, as their main concern is to explore and produce crude oil and gas profitably.

There is no doubt that the exploration of oil and gas has tremendously improved the Nigerian economy and has contributed hugely to the federation's account. However, the

price the society and the environment of host region had had to pay has far more adverse consequences [25]. According to the a World Bank report, "the Niger Delta has been blessed with an abundance of physical and human resources, including the majority of Nigeria's oil and gas deposits, good agricultural land, extensive forest, excellent fisheries, as well as developed industrial base, and a vibrant private sector" [19]. Unfortunately, the region's huge potential for economic growth and sustainable development remains unfulfilled and its future is threatened by deteriorating economic, social and environmental conditions that are not being addressed by government policies and actions. ■

LITERATURE

1. **Nwaru, C. K.** (2015). Tax Revenue Performance: A Comparative Study of Oil and Non-oil Tax Revenue on Nigeria's GDP / C. K. Nwaru. – Federal Inland Revenue Service, Abuja HQ. 08036715887, p9.
2. **Cobham, A.** (2014). Nigeria's Upward Revision of GDP: Center for Global Development / A. Cobham [Electronic resource]. – Mode of access : <http://www.cgdev.org/blog/nigerias-upward-revision-gdp-should-sound-alarm-tax-gdp-ratio>
3. **Godwin, A.** The Punch: IMF predicts 9% GDP growth rate for Nigeria/ Atser Godwin. [Electronic resource]. – Mode of access : www.Punchng.com
4. **Uyigwe, E.** (2007). Coping with Climate Change and Environmental Degradation in the Niger-Delta of South Nigeria. Benin / E. Uyigwe, M. Agho. – Community Research and Development Centre (CREDC). Benin 300001 Edo State, Nigeria.
5. **Francis, P.** (2008). Niger Delta Social and Conflict Analysis / Paul Francis. – World Bank sustainable development department African region. Nigeria. – P. 62.
6. **Osuji, C.** (2004). Metals associated with Crude oil / C. Osuji, C. Onojake // Journal of Chemistry and Biodiversity. – Vol. 1 1708.
7. **Oyebamiji, (2014).** Emulating global climate change impacts on crop yields / Oluwole K. Oyebamiji, Neil R. Edwards, Philip B. Holden et al. // Statistical Modelling The Open University. – Walton Hall, Milton Keynes.
8. **Nwilo, P.** (2005). Impacts and Management of Oil Spill Pollution along the Nigerian Coastal Areas / P. Nwilo, O. Badejo. – University of Lagos, Lagos-Nigeria.

9. Ekwugha, E. U. (2014). The Management of Oil Spillage in the Niger delta region of Nigeria : dissertation / Elizabeth U. Ekwugha. – University of South Wales [Electronic resource]. – Mode of access : http://www.academia.edu/7337127/THE_MANAGEMENT_OF_OIL_SPILLAGE_IN_THE_NIGER_DELTA_REGION_OF_NIGERIA_A_Dissertation_submitted_in_part_fulfillment_of_MSc_Environmental_Management

10. Francis, P. (2011). Securing Development and Peace in the Niger Delta: A social and Conflict analysis for change / Paul Francis, Deirdre Lapin and Paula Rossiasco. – Woodrow Wilson International Centre for Scholars, 1-178. Retrieved 30th October, 2012 (from www.wilsoncenter.org)

11. Amnesty International 2014: Amnesty warns on 'seriously alarming' Nigeria oil spills [Electronic resource]. – Mode of access : <http://phys.org/news/2015-03-amnesty-alarming-nigeria-oil.html>

12. Opukri, C. O. (2008). Oil Induced Environmental Degradation and Internal Population Displacement in the Nigeria's Niger Delta / C. O. Opukri, I. S. Ibaba // *Journal of Sustainable Development in Africa*. – Vol. 10, No. 1. – P. 173–193. Retrieved 6th November, 2012.

13. Ajugwo A. O. (2013). Negative Effects of Gas Flaring: the Nigerian Experience / Anslom O. Ajugwo // *Journal of Environment Pollution and Human Health*. – Vol. 1, Issue 1. – Pp. 6–8. DOI: 10.12691/jephh-1-1-2.

14. CJP/ERA (2005). Gas flaring in Nigeria: A human rights, environmental and economic monstrosity, Amsterdam and Port Harcourt: The Climate Justice Programme and Environmental Rights Action/Friends of the Earth Nigeria [Electronic resource]. – Mode of access : https://www.foe.co.uk/sites/default/files/downloads/gas_flaring_nigeria.pdf

15. Clarke, D. (2009). Crude Continent: The Struggle for Africa's Oil Prize; Poisoned Wells: the Dirty Politics of African Oil / Duncan Clarke, Nicholas Shaxson // *Foreign Affairs*. – January/February [Electronic resource]. – Mode of access : <https://www.foreignaffairs.com/reviews/capsule-review/2009-01-01/crude-continent-struggle-africas-oil-prize-poisoned-wells-dirty>

16. Nigerian National Petroleum Corporation (NNPC) Annual Statistical Bulletin. 2002, 2012, and 2014. Abuja, Nigeria [Electronic resource]. – Mode of access : www.nnpcgroup.com

17. Kadafa A. A. (2012). Environmental Impacts of Oil Exploration and Exploitation in the Niger Delta of Nigeria / Ayuba A. Kadafa // *Global Journal of Science Frontier Research Environment & Earth Sciences*. – Vol. 12, Issue 3. Version 1.0. – P. 18–28.

18. United Nation Environmental Programme – UNEP, (2011). Environmental assessment of Ogoni Land [Electronic resource]. – Mode of access : www.unep.org/nigeria

19. Singh, J. (1995). Defining an Environmental Development Strategy for the Niger Delta / Jasdip Singh, David Moffat, Olof Linden. – The World Bank, Vol. 1. – P. 59.

20. Adeyemo, A. M. (2002). The Oil Industry Extra Ministerial Institutions and Sustainable Agricultural Development: A Case Study of Okrika L.G.A. of Rivers State / A. M. Adeyemo // *Nigerian Journal of Oil and Politics*. – Vol. 2, No. 1. – Pp. 60–78.

21. Ordinioha, B. Acute health effects of a crude oil spill in a rural community in Bayelsa State, Nigeria / B. Ordinioha, W. Sawyer // *Niger J Med*. – 2010. – Vol. 19, No. 2. – Pp. 140–144.

22. Telizhenko O. M. & Shvindina G. O. Scientific Direction / Department of Management, Sumy State University, 2015.

23. World Health Organization. Facing the facts: The Impact of Chronic Disease in Nigeria. Geneva [Electronic resource]. – Mode of access : http://www.who.int/chap/chronic_disease_report/en/ (12 March, 2011).

24. Hamso, B. Time to End Routine Gas Flaring / Bjorn Hamso. – World Bank, July 7, 2014 [Electronic resource]. – Mode of access : <http://www.worldbank.org/en/news/feature/2014/07/15/gas-flaring-reduction-takes-center-stage-at-global-event>

25. Nwosu, J. E. Environmental Degradation: The Impact of Oil Exploration in the Niger-Delta Region, Nigeria / J. E. Nwosu // *Вісник СумДУ. Серія «Економіка»*. – 2013. – № 2. – P. 24 – 29.

Supervisor: Shvindina H. O., Candidate of Sciences (Economics), Associate Professor, Sumy State University

REFERENCES

"Amnesty International 2014: Amnesty warns on 'seriously alarming' Nigeria oil spills". <http://phys.org/news/2015-03-amnesty-alarming-nigeria-oil.html>

Ajugwo, A. O. "Negative Effects of Gas Flaring: the Nigerian Experience". *Journal of Environment Pollution and Human Health*, vol. 1, no. 1 (2013): 6-8.

Adeyemo, A. M. "The Oil Industry Extra Ministerial Institutions and Sustainable Agricultural Development: A Case Study of Okrika L. G. A. of Rivers State". *Nigerian Journal of Oil and Politics*, vol. 2, no. 1 (2002): 60-78.

Cobham, A. "Nigeria's Upward Revision of GDP: Center for Global Development". <http://www.cgdev.org/blog/nigerias-upward-revision-gdp-should-sound-alarm-tax-gdp-ratio>

Clarke, D., and Shaxson, N. "Crude Continent: The Struggle for Africa's Oil Prize; Poisoned Wells: the Dirty Politics of African Oil". <https://www.foreignaffairs.com/reviews/capsule-review/2009-01-01/crude-continent-struggle-africas-oil-prize-poisoned-wells-dirty>

Ekwugha, E. U. "The Management of Oil Spillage in the Niger delta region of Nigeria : dissertation". http://www.academia.edu/7337127/THE_MANAGEMENT_OF_OIL_SPILLAGE_IN_THE_NIGER_DELTA_REGION_OF_NIGERIA_A_Dissertation_submitted_in_part_fulfillment_of_MSc_Environmental_Management

Francis, P., Lapin, D., and Rossiasco, P. *Securing Development and Peace in the Niger Delta: A social and Conflict analysis for change*, 2011.

Francis, P. *Niger Delta Social and Conflict Analysis*. Nigeria: World Bank sustainable development department African region, 2008.

"Gas flaring in Nigeria: A human rights, environmental and economic monstrosity, Amsterdam and Port Harcourt: The Climate Justice Programme and Environmental Rights Action/Friends of the Earth Nigeria". https://www.foe.co.uk/sites/default/files/downloads/gas_flaring_nigeria.pdf

Godwin, A. "The Punch: IMF predicts 9% GDP growth rate for Nigeria". www.Punchng.com

Hamso, B. "Time to End Routine Gas Flaring". <http://www.worldbank.org/en/news/feature/2014/07/15/gas-flaring-reduction-takes-center-stage-at-global-event>

Kadafa, A. A. "Environmental Impacts of Oil Exploration and Exploitation in the Niger Delta of Nigeria". *Global Journal of Science Frontier Research Environment & Earth Sciences*, vol. 12, no. 3, Version 1.0 (2012): 18-28.

Nwilo, P., and Badejo, O. *Impacts and Management of Oil Spill Pollution along the Nigerian Coastal Areas Lagos-Nigeria*: University of Lagos, 2005.

"Nigerian National Petroleum Corporation (NNPC) Annual Statistical Bulletin. 2002, 2012, and 2014. Abuja, Nigeria". www.nnpcgroup.com

Nwaru, C. K. *Tax Revenue Performance: A Comparative Study of Oil and Non-oil Tax Revenue on Nigeria's GDP*: Federal Inland Revenue Service, Abuja HQ. 08036715887, 2015.

Nwosu, J. E. "Environmental Degradation: The Impact of Oil Exploration in the Niger-Delta Region, Nigeria" [ENGLISH_UA Environmental Degradation: The Impact of Oil Exploration in the Niger-Delta Region, Nigeria]. *Visnyk SumDU. Serii «Ekononika»*, no. 2 (2013): 24-29.

Opukri, C. O., and Ibaba, I. S. "Oil Induced Environmental Degradation and Internal Population Displacement in the Nigeria's Niger Delta". *Journal of Sustainable Development in Africa*, vol. 10, no. 1 (2008): 173-193.

Oyebamiji, O. K. "Emulating global climate change impacts on crop yields". In *Statistical Modelling The Open University*. Walton Hall: Milton Keynes, 2014.

Ordinioha, B., and Sawyer, W. "Acute health effects of a crude oil spill in a rural community in Bayelsa State, Nigeria". *Niger J Med*, vol. 19, no. 2 (2010): 140-144.

Osuji, C. "Metals associated with Crude oil". *Journal of Chemistry and Biodiversity*, vol. 1 1708 (2004).

Singh, J., Moffat, D., and Linden, O. "Defining an Environmental Development Strategy for the Niger Delta". *The World Bank*, vol. 1 (1995): 59.

Telizhenko, O. M., and Shvindina, G. O. *Scientific Direction: Department of Management, Sumy State University*, 2015.

Uyigue, E., and Agho, M. *Coping with Climate Change and Environmental Degradation in the Niger-Delta of South Nigeria. Benin, Nigeria: Community Research and Development Centre (CREDC)*, 2007.

"United Nation Environmental Programme – UNEP". www.unep.org/nigeria

"World Health Organization. Facing the facts: The Impact of Chronic Disease in Nigeria. Geneva". http://www.who.int/chap/chronic_disease_report/en/

УДК 321.01:351.746.1:336.14(477)

ДЕЦЕНТРАЛІЗАЦІЯ ВЛАДИ В УКРАЇНІ: АДМІНІСТРАТИВНІ ТА БЮДЖЕТНІ АСПЕКТИ, НАЦІОНАЛЬНА БЕЗПЕКА

© 2015 ДЕНИСОВ К. В.

УДК 321.01:351.746.1:336.14(477)

Денисов К. В. Децентралізація влади в Україні: адміністративні та бюджетні аспекти, національна безпека

Досліджено питання практичної реалізації реформи місцевого самоврядування та територіальної організації влади в Україні (децентралізації влади) з точки зору адміністративних, бюджетних і безпекових аспектів. Базою для дослідження вибрані положення Конституції України та Бюджетного кодексу як таких, що зазнали та можуть зазнати суттєвих змін у ході реформи децентралізації. Проаналізовано процес та наслідки створення «об'єднаних територіальних громад» у контексті адміністративно-територіальної реформи. Доведено невідповідність задекларованих принципів реформування адміністративного устрою та бюджетної системи рішенням, які були прийняті на початковому етапі. Обґрунтовано негативні наслідки бюджетної децентралізації для Запорізької області на підставі даних офіційної статистики Міністерства фінансів, Державної казначейської служби та департаменту фінансів обласної державної адміністрації. Доведено, що рівень бюджетної залежності області значно виріс після впровадження реформи, скоротилися власні надходження місцевих бюджетів на тлі збільшення обсягів дотацій, які передаються урядом до органів місцевого самоврядування з центрального бюджету. Зроблено висновок про необхідність подальшого науково-практичного обґрунтування процесів децентралізації влади перед ухваленням остаточних рішень по ній. Обґрунтовано, що це дозволить забезпечити позитивний вплив реформи на соціально-економічну ситуацію в Україні та Запорізькій області, створивши умови для переходу до сталого розвитку.

Ключові слова: децентралізація, місцеве самоврядування, фіскальна автономія, територіальний устрій, міжбюджетні відносини, природні ресурси, особливий статус Донбасу.

Рис.: 2. **Бібл.:** 12.

Денисов Костянтин Вікторович – кандидат економічних наук, керівник економічної служби ВО «Свобода» у Запорізькій області (пр. Леніна, 74, к. 119, Запоріжжя, 69063, Україна)

E-mail: denisovkv@ukr.net

УДК 321.01:351.746.1:336.14(477)

Денисов К. В. Децентрализация власти в Украине: административные и бюджетные аспекты, национальная безопасность

Исследован вопрос практической реализации реформы местного самоуправления и территориальной организации власти в Украине (децентрализации власти) с точки зрения административных, бюджетных аспектов, а также национальной безопасности. Базой для исследования выбраны положения Конституции Украины и Бюджетного кодекса как таковых, которые претерпели и могут претерпеть существенные изменения в ходе реформы децентрализации. Проанализированы процесс и последствия создания «объединенных территориальных общин» в контексте административно-территориальной реформы. Доказано несоответствие задекларированных принципов реформирования административного устройства и бюджетной системы тем решениям, которые были приняты на начальном этапе. Обоснованы негативные последствия бюджетной децентрализации для Запорожской области на основании данных официальной статистики Министерства финансов, Государственной казначейской службы и департамента финансов областной государственной администрации. Доказано, что уровень бюджетной зависимости области значительно вырос после внедрения реформы, сократились собственные поступления местных бюджетов на фоне увеличения объемов дотацій, которые передаются правительством к органам местного самоуправления из центрального бюджета. Сделан вывод о необходимости последующего научно-практического обоснования процессов децентрализации власти перед принятием окончательных решений по ней. Обосновано, что это позволит обеспечить позитивное влияние реформы на социально-экономическую ситуацию в Украине и Запорожской области, создав условия для перехода к устойчивому развитию.

Ключевые слова: децентрализация, местное самоуправление, фискальная автономия, территориальное устройство, межбюджетные отношения, природные ресурсы, особый статус Донбасса.

Рис.: 2. **Библ.:** 12.

Денисов Константин Викторович – кандидат экономических наук, руководитель экономической службы ВО «Свобода» в Запорожской области (пр. Ленина, 74, к. 119, Запоріжжя, 69063, Україна)

E-mail: denisovkv@ukr.net

UDC 321.01:351.746.1:336.14(477)

Denysov K. V. Decentralization of Power in Ukraine: Administrative and Budgetary Aspects, National Security

The article researches the issue of practical implementation of the reform of local self-government and territorial organization of power in Ukraine (decentralization) in terms of administrative, budgetary aspects, as well as national security. The examination was based on such provisions of both the Constitution of Ukraine and the Budget Code, which have undergone and may undergo significant changes in the course of the reform of decentralization. The process and implications of establishment of the «united territorial communities» has been analyzed in the context of the administrative-territorial reform. Discrepancy of the declared principles of reforming both the administrative structure and budgetary system towards with decisions, which were adopted at an early stage, has been proven. Negative effects of fiscal decentralization for Zaporizhzhia region have been substantiated on the basis of the official statistics by the Ministry of Finance, State Treasury Service and the Department of Finance of the State regional administration. It has been proven that the level of fiscal dependency of the region has grown considerably since the introduction of the reform, own revenues of local budgets have been reduced against the background of increasing amounts of subsidies, which are transferred by the Government to the local self-government bodies from the central budget. It has been concluded that a subsequent scientific substantiation as to processes for decentralizing power should be carried out, before making final decisions on it. As has been substantiated, this will ensure the positive impact of the indicated reform on the socio-economic situation in both Ukraine and Zaporizhzhia region, creating conditions for further transition to a sustainable development.

Keywords: decentralization, local self-government, fiscal autonomy, territorial division, inter-budgetary relations, natural resources, special status of Donbass.

Fig.: 2. **Bibl.:** 12.

Denysov Kostyantyn V. – Candidate of Sciences (Economics), Chief, economic service, All-Ukrainian Union "Freedom" in the Zaporizhzhia region (pr. Lenina, 74, office 119, Zaporizhzhia, 69063, Ukraine)

E-mail: denisovkv@ukr.net