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Pioneering the Quest for Economic-Environmental-Equilibrium Point for Sustainable Growth

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Abstract

In order to achieve sustainable growth in the economic-environmental ecosystem, rational utilization of natural resources of the world is necessary. The article/research paper presents an evolutionary dimension to equilibrium-based economics. Dynamic flux and stationary state in contemporary macro dynamics and macro static economics provide inadequate explanations to economic problems of the world, hence a mechanism of macro-constancy at equilibrium state is proposed. An integrated conceptual framework based on innovative econometric modelling, and structural reforms for sustainable economic growth, are highlighted in the paper. The theoretical framework is a combination of the classical, neo-classical and Keynesian economic thought to view world economy with the vision of attaining perfect equilibrium between economic growth and environmental disruption in order to create a sustainable ecosystem. The statistical framework is based on global economic data from various sources covering key econometric parameters, with the aim to formulate a new realistic indicator for economic growth, and formulation of an econometric model based on these parameters. Holistic concepts of common ownership of world's natural resources and of the global wealth pool created out of their prudent utilization are molded into an innovative wealth distribution model for equitable growth and social justice. The research seeks to guide global institutions in their mission of achieving sustainable development. It proposes mandatory participation and collaboration of global nations. The mission is to achieve Sustainable Growth through optimal utilization of Natural Resources at economic-environmental equilibrium point.

Keywords

Economic-Environmental Equilibrium (EEE), Gross Natural Resource Product (GNRP), Universal Gross Domestic Product (UGDP), Universal Gross Natural Resource Product (UGNRP.

INTRODUCTION

Economic activity is necessary for a progressive human society. Natural resources of the planet, both subsoil and supra-soil, constitute the DNA (building blocks) of economic activity; wealth is the outcome. Wealth created through optimal utilisation of natural resources must be distributed equally among all nations in order to achieve the Sustainable Development Goals of poverty eradication, decent economic growth, reduce inequalities, sustainable communities, stronger global institutions, responsible consumption and production, and overall peace, justice and equality.

Predictive research on sustainable economic-environmental growth using forecast analysis techniques demands that variables for growth must be under the control of not just social entrepreneurs, but society as a whole. Prudent utilisation of resources and the re-distribution of wealth created ensures sustainability, while social and environmental responsibility in business will help preserve our planet for future generations.

Rational utilization of natural resources of the world [1] [2] is necessary in order to achieve sustainable growth in the economic-environmental ecosystem. economic problems of the world cannot be explained by the dynamic flux and stationary states. Hence an equilibrium-based econometric [3] model of macro-constancy at equilibrium state is proposed with the vision of attaining perfect equilibrium between economic growth and environmental degradation in order to create a sustainable ecosystem [4] [5]. A new realistic indicator for economic growth [6] [7] is proposed to overcome the fallacies of GDP as an inadequate growth indicator. Societal and holistic concepts of common ownership [8] [9] of world's natural resources and of the global wealth pool are used to create into an innovative wealth redistribution model for ensuring sustainable goals of social justice [10] and equitable growth. Sustainable Growth is only possible through optimal utilization of natural resources at economic-environmental an equilibrium point.

OBJECTIVES

It is observed that disruptive economic phenomenon like recessions and depressions due to volatile cyclic situations affect humanity across the world adversely. A remedial solution to such economic upheavals is urgently sought. Further deep study into their causes and effects reveal that the current economic indicator of economic growth, GDP, is inadequate and inconsistent [11], not only in explaining the economic upheavals, but also in its very basic nature to define economic growth adequately. This research seeks to remove these inconsistencies and to re-define economic growth by proposing an alternative indicator [12] i.e. GNRP.

Furthermore, the research proposes a macro-constancy state of economic equilibrium necessary for sustainable growth i.e. a balance between economic growth and resource utilization necessary for achieving that growth.

Following are the new economic concepts introduced in the paper:

a. GNRP: Indicator of **potential** economic growth
b. UGDP: Global pool of cumulative wealth productivity of nations
c. UGNRP: Global pool of **potential** wealth productivity of nations

Research notes

- GNRP (Gross Natural Resource Product) is the valuation of the raw resources of economy based on a common price mechanism.
- UGDP (Universal Gross Domestic Product) is the sum of the GDP of all the nations of the world.
- UGNRP (Universal Gross Natural Resource Product) is the sum of the GNRP of all the nations of the world.
- Common-pool resource (CPR) is one which, if potential beneficiaries are excluded from using it, becomes too costly. Congestion or overuse causes rivalry for the resource, whereas a public good is both non-excludable and non-rivalrous
- Balance of Nature [13] [14] [15]: The "balance of nature" is a theory that proposes that ecological systems are usually in a stable equilibrium. A small change in some particular parameter will be corrected by some negative feedback that will bring the parameter back to its original "point of balance" with the rest of the system.
- Common-pool resource [16] is one which, if potential beneficiaries are excluded from using it, becomes too costly. Congestion or overuse causes rivalry for the resource, whereas a public good is both non-excludable and non-rivalrous
- Common Pricing mechanism [17]: The price is based on Indices of Market Prices for Non-Fuel and Fuel Commodities, 2014-2017 (2005=100, in terms of U.S. dollars) for different units of quantity specifications

METHODS

Brief methodology

This study is an ongoing research process that aims to disrupt established norms that are inconsistent with global efforts to achieve Sustainable Development Goals. The Research follows an Inductive/Deductive approach, as it supports Positivism and Phenomenology. The "*Good Fit*" between Social Reality and Theory that emerges is "*Grounded in Reality*". It is in principle an Inductive Approach that builds up a theory and explores data without a predetermined framework.

- ✓ *Type of Research*: It is an exploratory type of research using secondary data from panel data framework.
- ✓ *Research Approach*: This research applies an "Experimental" approach, wherein a simple model with few equations and variables is applied initially. The model is based on a priori theoretical grounds, but it is not rigid. It combines a priori theoretical considerations with empirical observations to extract maximum information from data.
- ✓ *Research Design*: A mixed-methods design is used by integrating both qualitative and quantitative research designs to be more fixed and deductive. Descriptive quantitative research design is used to measure variables and describe relationships between them, and to describe characteristics, averages, summations and trends.
- ✓ Sampling Method: Non-probability sampling method is used to collect samples selected in a non-random way without any research bias.
- ✓ *Data Collection Methods*: Secondary data from reliable government surveys and global economic databases which are open source is used. Analysis of this raw data expands the scope of the research. It is reliable as the results can be consistently reproduced, and valid as it actually measures the prescribed concepts.
- ✓ *Inclusion and Exclusion Criteria*: Only 64 of 189 nations are considered as they contribute to 96 % of the data to be measured (World GDP) consistently. Economic data irrelevant to the concept under study are excluded.
- ✓ *Data Analysis Strategies*: Quantitative data analysis like inferential statistics using statistical analysis is used to summarize sample data, make estimates, and test hypotheses. Qualitative data analysis of the information and ideas in detail to interpret meanings and identify patterns, and extract most relevant parts. Thematic analysis of the content of the data is organized to identify key themes.

Variables and hypotheses are defined in advance before data collection.

Variables

Following economic variables are used:

GDP, Population, Agriculture revenue, Mineral output, Mineral pricing

Hypotheses/assumptions

Following assumptions form the basis of this research:

1. Common Ownership of resources [8]

Natural resources are freely and abundantly provided to mankind by the benevolent planet. As such, nations cannot claim ownership to resources, and mankind is mere custodian of these resources for its own progress.

2. Cumulative Wealth pool [18]

Natural resources are common property of mankind. All of mankind has equal proprietary right to the entire wealth pool created out of the utilization of natural resources for

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economic growth.

3. Common Pricing mechanism [17]

As natural resources at extraction level must be priced at the same level irrespective of scarcity/abundance, geographic & demographic limitations, quality & texture, and such other differentiating parameters. This will ensure elimination of economic fluctuations caused by profit-based dynamic pricing and reinforce the quest for equilibrium mechanism. Pricing differentiation may

Objectives of the research

- To propose GNRP (Gross Natural Resource Product) as an alternative to GDP
- Wealth Redistribution Model- new econometric model for sustainable growth
- Predict E3 (Economic-Environmental Equilibrium) point of macroconstancy

The two-step methodology used to achieve the objectives is:

a. Database analysis
b. Predictive analysis

Step 1: Database analysis

- Macroeconomic data of 64 top GDP nations of the world from various sources over a period of 05 years from 2010 to 2014 is considered.
- Database of four key variables: GDP, population, agriculture income, and quantity of natural resources (minerals) extracted annually is sourced.
- A common pricing mechanism for determining the annual mineral value of a nation is applied in order to achieve macroconstancy.
- Commonality of measurement units is tabulated to maintain constancy in physical measurement of minerals extracted annually using a factor method.
- Population of nations is used as a multiplicative factor as these are internal consumers contributing to the economic growth (GDP) of a nation.
- GNRP (Wealth Potential) of a nation based on valuation of mineral resources at source using common price mechanism, agriculture income and population factor is calculated using a logical common sense mathematical formula.

Step 2: Predictive analysis

- Forecast analysis is used for predicting economic growth for the year 2022 in GDP and GNRP terms. GDP indicates growth achieved post economic business cycle. GNRP is potential growth achievable before economic business cycle.
- UGDP and UGNRP are the cumulative GDP and GNRP concepts. They are used to determine excess growth achieved over mean cumulative growth.
- Excess growth (GDP less mean UGDP) for a nation is ploughed back to GNRP value of that nation for the next business cycle. This will **restrict usage** of natural resources in the next business cycle for higher profit-based growth.
- Thus, the dual objectives of restricting excess wealth creation by conserving natural resources utilization can be achieved at **E3 point of macroconstancy**.

Databases used in the paper: nations and their economic data

1. GDP data of 64 Nations for period 2010-2014 and for 2017.
2. Database of Minerals Extracted during this period (2010-2014)
3. Agriculture Income during this period (2010-2014)
4. Population size during this period (2010-2014)

Research Phenomenon Observed

A study of the top 64 nations based on their GDP (USD bn.) over a period of 5 years (2010-2014) and the contribution of these 64 nations to the cumulative value of world GDP for the year 2017 is presented below:

Table 1. GDP of Top 64 nations– (2010-14) *in USD bn.*

SN	Country Name	Cumulative	SN	Country Name	Cumulative
1	United States	951.41	17	Turkey	50.08
2	China	474.33	18	Indonesia	49.09
3	Japan	332.97	19	Switzerland	38.70
4	Germany	217.69	20	Saudi Arabia	38.68
5	France	165.43	21	Sweden	31.78
6	United Kingdom	157.70	22	Belgium	30.45
7	Brazil	138.86	23	Poland	30.18
8	Italy	129.42	24	Iran	29.83
9	Russian Federation	112.44	25	Argentina	29.11
10	India	105.23	26	Norway	28.44
11	Canada	102.33	27	Nigeria	24.95
12	Spain	84.92	28	Austria	24.91
13	Australia	80.26	29	Thailand	22.18
14	Korea, Rep.	71.39	30	South Africa	22.02
15	Mexico	68.64	31	Venezuela	21.50
16	Netherlands	51.63	32	UAE	20.63
33	Denmark	20.10	49	Iraq	11.23
34	Colombia	19.84	50	Kazakhstan	11.22
35	Malaysia	17.31	51	Romania	10.83
36	Greece	16.39	52	Peru	10.35
37	Singapore	16.04	53	New Zealand	10.04
38	Finland	15.72	54	Qatar	9.82
39	Israel	15.63	55	Ukraine	9.09
40	Hong Kong	15.21	56	Kuwait	8.86
41	Egypt	15.17	57	Vietnam	8.71
42	Chile	14.50	58	Bangladesh	8.03
43	Ireland	14.19	59	Hungary	8.02
44	Portugal	13.99	60	Angola	6.29
45	Philippines	13.99	61	Morocco	6.02
46	Czech Republic	12.65	62	Puerto Rico	5.99
47	Pakistan	12.59	63	Slovak Republic	5.69
48	Algeria	11.31	64	Ecuador	4.97

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Table 2. World GDP and Share of top 64 nations *(Year 2017)*

Aggregate	Cumulative GDP	Percentage of
TOP 64 nations	74,577	95.63 %
World GDP	77,988	

Source: IMF Statistics.com

Table 3. Cumulative GDP of top 64 Nations (2010-2014)

GDP	2010	2011	2012	2013	2014
Group A total (a)	49107 722	54265 329	55434 045	56764 807	57649 003
Group B total (b)	13609 781	15383 729	15683 587	16258 550	16201 625
GDP_{cum} (a + b)	62717 503	69649 058	71117 633	73023 357	73850 628
Mean GDP_{cum}	**97996 1**	**10882 67**	**11112 13**	**11409 90**	**11539 16**

Note: The 64 nations are divided into two distinct groups A & B as follows:

1. Group A consists of 15 nations whose GDP exceed mean cumulative GDP
2. Group B consists of 49 nations whose GDP is less than mean cumulative GDP

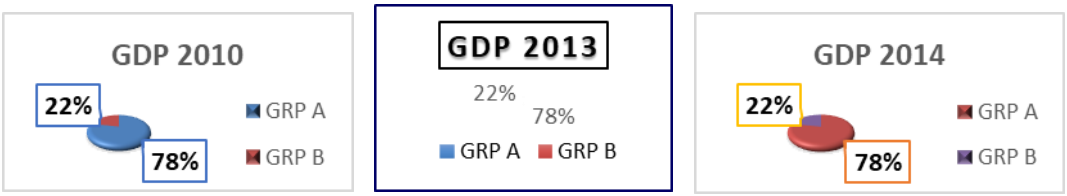

Figure 2. Graph of Cumulative GDP percentage share of A & B

Observation of Anomalous Facts:

1. Group A nations always achieve economic growth above mean cumulative GDP
2. Group B nations never achieve GDP growth equal to mean cumulative GDP
3. Proportionate share of both groups for cumulative GDP is always 22:78

Inference:

a. GDP in its current form is a grossly inadequate indicator of economic growth.
b. Currently, GDP indicates economic achievement in terms of wealth created *after* any economic business cycle, which is an irreversible process. There is a gap between factual and manipulated data at global level.
c. Hence the need to redefine economic growth as "Wealth Potential" instead of "Wealth Created" by assigning value to natural resources at extraction level *before* at pre-economic business cycle level.
d. Further investigation into this irrational distribution of the GDP of these 64 nations is necessary.

Methodology/approach

Conceptual Framework for deriving the following is presented below

Part 1: Calculate GNRP of a nation (Basic Statistical method)

Part 2: Wealth Redistribution Model (WRM- Econometric Model)

Part 3: E3 Point of macroconstancy (Forecast analysis)

Part 1: Calculate GNRP of a nation (Basic Statistical method)

a) GNRP of a nation is the new proposed indicator of its Wealth Potential. GNRP is the mathematical product of the Land Revenue of a nation and its population.
b) Land Revenue is the sum of Agriculture and Mineral revenue, while Population parameter is adjusted for a conversion factor for simplicity of mathematical calculation purpose.
c) GNRP of any nation is primarily based on the Valuation of its natural resources (both supra-soil and subsoil) at the extraction stage *before* they enter the business cycle for human economic activity production and consumption.

Main stages involved in calculating GNRP of a nation are

1. Calculate Mineral Value of a nation
2. Obtain Agriculture Income and Population data
3. Derive GNRP using a simple mathematical formula

The following database is used to derive GNRP of a nation:

- ✓ Mineral resources – quantity extracted
- ✓ Agriculture Income
- ✓ Population of a nation

Note: In order to achieve commonality in quantifying values, the research uses

A. Common Price mechanism
B. Conversion factor for normalizing units of measurement

Stage 1: Calculate Mineral Value of a Nation

In order to calculate GNRP, it is necessary to understand the *Mineral Value of a Nation*. It is the simple product of quantity of minerals extracted and the common price established. The conversion factor is used to normalize the units of physical measurement [19].

The steps involved are:

1. To establish the Conversion factor
2. To calculate mineral value for the particular commodity
3. To arrive at the aggregate value of all minerals for a particular nation

Step 1: Conversion factor

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It is observed that the measuring unit for quantity and price for most minerals differ. There should be commonality in measuring the production and the pricing of minerals. A conversion factor is used to achieve this commonality.

Table 4. Difference in Measuring Units for Quantity and Price of Minerals

Mineral	Unit of Physical Quantity	Price	Unit of Pricing
Alumina	thousand metric tons	283.1	USD/T
Diamond	thousand carats	1400.0	USD/carat
Anthracite Coal	thousand metric tons	42.6	USD/T
Zirconium	metric tons	75000.0	USD/T
Talc (Pyrophyllite)	thousand metric tons	167.0	USD/mT
Natural gasoline (butane)	million 42-gallon barrels	8.1	USD/MMBtu
Gold	metric tons	1223.7	USD/oz.
Steel, crude	thousand metric tons	300.0	USD/mT
Liquefied petroleum gas	thousand 42-gallon barrels	100.2	USD/bbl.
Ferrochromium	metric tons	2480.0	USD/T
Uranium	metric tons	25.7	USD/lbs.

Step 2: Mineral Value of Commodities (Economic Value of minerals)

The economic value for a particular commodity (mineral) is calculated as a simple mathematical product of quantity extracted and its common price, with the conversion factor to neutralize the difference in units of measurement.

Table 5. Economic Value of Mineral: Crude Steel

Commodity	Crude Steel				
Year	Economy	Production Unit thousand mT	Avg price USD/mT	Conversion Factor	Mineral Value (US$ mn)
2012	Bahrain	950	300.00	1000	285.00
2013		970			291.00
2014		970			291.00
2012	Zimbabwe	15	300.00	1000	4.50
2013		15			4.50
2014		15			4.50
2012	China	723,880	300.00	1000	217164.00
2013		779,040			233712.00
2014		822,300			246690.00
2012	USA	88.7	545.00	1000000	48341.50
2013		86.9			47360.50
2014		88.2			48069.00

Step 3. Total Aggregate Mineral Value of a nation

The economic value of all minerals for a given nation is calculated as below:

1. Obtain the Quantity of Production (extraction) of all minerals
2. Establish Common Price and Conversion factor for each mineral
3. Calculate Economic value: Quantity x Common Price x Conversion Factor

Table 6. Aggregate Mineral Value of 6 Afro-Asian nations (*USD mn*)

Total Mineral Value	2012	2013	2014
Australia	234806	226740	No data
Bahrain	17523	16889	16766
China	34635730	39740951	36818464
Japan	430174	345223	323331
South Africa	7315218	8195571	No data
Zimbabwe	19582	17455	9991

Stage 2: Data Collection

This involves obtaining annual macroeconomic data about Agriculture Income and Population for a nation.

Stage 3: GNRP- Proposed Indicator of Economic Growth Potential

GNRP is a simple mathematical product of the Land Revenue and the Population, adjusted for a conversion factor for simplicity of mathematical calculation purpose.

The value of population factor is **0.001** (population in mn/1000).

Thus, the formula for GNRP calculation is:

GNRP (USD mn) = Land Revenue (USD mn) * Population (mn) * 0.001 (1)

GNRP: Gross Natural Resource Product (USD mn)

Land Revenue: Sum of Agriculture and Mineral revenue (USD mn)

Population: value in million

Population Factor: 0.001

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Table 7. GNRP Calculation for China (2010-2014)

China	Mineral	Agriculture	Land Revenue	Population	Pop Factor	GNRP
2010	34787250	581401	35368652	1337.71	0.00	4731282
2011	41075086	714433	41789519	1344.13	0.00	5617054
2012	34635730	806399	35442129	1350.70	0.00	4787150
2013	39740951	893010	40633961	1357.38	0.00	5515572
2014	36818464	949694	37768158	1364.27	0.00	5152596
	a	b	c = a + b	d	e	z = c * d *

Table 8. GNRP Calculation for South Africa (2009-2013)

South Africa	Mineral	Agriculture	Land Revenue	Population	Pop Factor	GNRP
2009	7372700	8843	7381543	50.26	0.001	295936
2010	8431704	9870	8441574	50.98	0.001	375349
2011	8307003	10563	8317565	51.73	0.001	416419
2012	7315218	9539	7324757	52.51	0.001	396328
2013	8195571	8552	8204124	53.31	0.001	366624
	a	b	c = a + b	d	e	z = c * d * e

Part 2: Wealth Redistribution Model (WRM): Basic working of the Econometric Model

Wealth inequality among nations is a global phenomenon leading growing economic problems like poverty and underdevelopment of nations. It is also well understood and accepted that the real issue with wealth inequality is the distribution of wealth [20][21][22], ***not its creation***. Applying this universal acceptance, this research proposes an innovative dynamic econometric model to redefine distribution of wealth created out of human economic activity among the nations of the world.

This Wealth Redistribution Model (WRM) proposes to reduce inequality and promote social justice among the nations of the world using a two-fold mechanism:

a) Reduction is usage of natural resources, thereby promoting sustainable economic growth that is need-based and not greed or profit-based
b) Distribution of any excess wealth created out of favourable economic activity back into the next economic cycle to reduce excessive cyclic profits.

The WRM mechanism follows following cyclic steps:

1. Calculating Cumulative Economic Potential of nations (UGNRP)
2. UGNRP is compared with Cumulative Wealth Created (UGDP)
3. GDP of each nation is compared with mean UGDP.
4. If GDP > mean UGDP, excess value is added to GNRP in next business cycle
5. Less resources are utilized in next business cycle.
6. Again, UGNRP is compared with UGDP in next cycle.
7. Steps from 2 to 5 are repeated till both values are equal. i.e. UGDP = UGNRP

This is the Economic-Environmental Equilibrium (E3) Point

Table 9: Comparison between UGNRP and UGDP of 64 Nations

YEAR	2010	2011	2012	2013
UGNRP (US$ mn)	52007958	60955507	52787419	60269486
UGDP (Current US$ mn)	62719513	69651069	71119645	73025370
Difference (US$ mn)	**10711555**	**8695561**	**18332226**	**12755883**

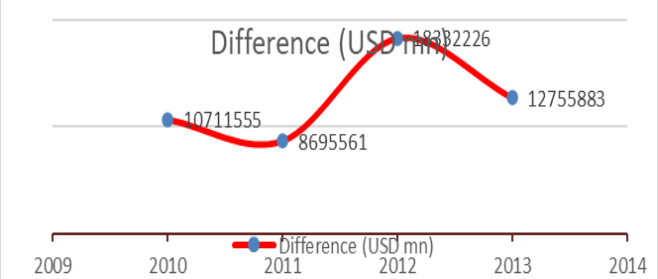

Figure 3. Graph of Difference between UGDP and UGNRP

Inference

a. Any state of world economy wherein UGDP does not match UGNRP signifies a state of disequilibrium.
b. In order for world economy to reach a state of equilibrium, both these values need to be the same for a continuous time period. This is the state of macro-constancy, the point of equilibrium at which sustainable growth for both planet and mankind is attainable.

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Conclusion

1. Mathematically, ideal equilibrium is the stage where UGDP = UGNRP.
2. It is proposed to devise a methodology by which *the difference between UGDP and UGNRP is* ***nil***.

Part 3: E3 Point of Economic Macroconstancy using Forecast analysis

Economic-Environmental Equilibrium is achieved under perfect "market clearance conditions", when factors of production (natural resources utilized) equal the wealth produced i.e. when **UGDP= UGNRP**

Economic-Environmental Equilibrium point can be achieved in two ways:

1. Preventing cyclic fluctuations using Wealth Distribution model
2. Common ownership of natural resources and UGDP

Sustainable Growth is proposed to be achieved in two ways:

1. Optimal utilization of natural resources through proposed WRM
2. Sufficing growth based on Malthusian principle of minimum growth

Stage 1: Achieving the Equilibrium Point using Forecast Analysis

In order to achieve the EEE point for sustainable growth, following steps are proposed:

1. Pre-determine the value of UGNRP to be achieved.
2. Target the deadline for achieving this predetermined value of UGNRP.
3. Control and regulate utilization of natural resources to evaluate UGNRP value.
4. At the targeted timeline, economic aggregates must be equal UGDP = UGNRP

Stage 2: Operationalizing the EEE Point through Forecast Analysis

1. Forecasting the Aggregate Economic Growth (GDP) Value

GDP forecast [18] by ***StatisticsTimes.com*** for 2017 and 2022. The GDP values (nominal and PPP) projected for world economy are as follows:

Table 10. World GDP (nominal and PPP) – year 2017

World economy (UGDP)	**GDP Nominal (USD bn)**		**GDP PPP (USD bn)**	
	2017	2022	2017	2022
	77,988	99,956	126,688	168,202

2. GDP forecast for the 64-nations Aggregate level based on share of world GDP

The nominal GDP forecast at aggregate level of economy for the world and the cumulative aggregate of the GDP values forecast for the 64 sample nations for the years 2017 and 2022 is tabulated below:

Table 11. World and 64-nation Aggregate GDP (forecast)

Aggregation Level of Economy	**GDP (USD bn)**		
	2017		2022
Cumulative 64	74,577		95,287
World (UGDP)	77,988		99,956

Source: StatisticsTimes.com

Observation

It is observed that the cumulative GDP value for the 64 nations for the period 2010-2014 is 95.63 % of the world GDP. For the purpose of the research, the cumulative GDP forecast for the 64 nations is also considered as 95.63 % of the projected World GDP value for 2017 and 2022 respectively.

Table 12. GDP forecast table

Economy	2017	% of		2022	% of
World	77,988			99,956	
Cumulative	74,577	95.63		95,287	95.33

Note: UGNRP (O) is the original cumulative GNRP values of the 64 nations before using the WRM working for ploughing back excess wealth into successive year's GNRP values. UGNRP (R) is the revised value after adding excess GDP values.

Table 13. UGNRP (O and R) and UGDP values

YEAR	**UGNRP (O)**	**UGNRP (R)**	**UGDP**
2010	52005948	52005948	62717503
2011	60953496	95361804	69649058
2012	52785407	90726738	71117633
2013	60267473	99033324	73023357
2014	56432279	96082237	73850628

Note: all values in USD mn

Forecasting GDP Value

The forecast of nominal GDP for world economy is made for the year 2017 and 2022. The growth rate achieved in the year 2017 and 2022 is calculated over the base year 2014. The UGDP values and the growth rate achieved is tabulated as follows:

Table 14. UGDP values for the 64 nations for 2017 and 2022

YEAR	**UGDP**	**Growth Rate**
2014	73850628	base year
2017 (forecast)	74579924	1.0099
2022 (forecast)	95587923	1.2943

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GDP Forecast of Top 3 Economies					
	2023	2024	2025	2026	2027
China	32,529.20	34,705.70	36,988.50	39,427.30	42,050.20
United States	26,185.20	27,057.20	28,045.30	29,165.50	30,281.50
India	12,813.10	13,972.90	15,196.80	16,497.40	17,854.70
			GDP, current prices, PPP, billion $US		

Figure 4. GDP forecast of Top 3 Economics

Stage 3: Concept of Zero Difference

The final aim of the research is to achieve zero difference between UGDP and UGNRP values. This **most critical stage** was proposed to be achieved in the year 2022.

Table 15. Working module for Projected Values of UGDP and UGNRP

Projected for 2022 (USD mn)			Projected for 2022 (USD mn)	
Projected UGDP 2022	95287011		Projected UGDP	95287011
Current UGDP 2014	73850628		Projected UGNRP	72812695
Rate of Growth	29.0%			
Current UGNRP 2014	56432279			
Projected UGNRP 2022	72812695			

Stage 4: Achieving Zero difference

1. E3 Point is possible when UGDP equals UGNRP i.e. when there is **zero difference** between the two values.
2. For year 2022, either UGDP or UGNRP must be a fixed value
3. Zero difference (UGNRP – UGDP) needs to be achieved.
4. UGNRP value in 2022 must equal the projected UGDP value. Economic growth (UGDP) is planned first.

Table 16. UGNRP equals Projected UGDP

YEAR	UGDP (USD bn)	YEAR	UGDP (USD bn)
2010	62718	2017	**74577**
2011	69649	2018	
2012	71118	2019	
2013	73023	2020	
2014	73851	2021	
2015		2022	**95287**
2016			

RESULTS

In order to plan for achieving the Economic-Environmental Equilibrium point in the year 2022, "Projected UGDP" values are fixed, while the "Planned UGRNP" values need to be controlled. *UGNRP value in 2022 must equal the projected UGDP value. UGDP values is fixed; natural resource allocation is controlled periodically.*

Projected UGDP = 95287011 USD mn. = Planned UGRNP

Conclusion: It is easier to control and regulate the allocation of natural resources than to control the economic activity at micro or macro level.

DISCUSSION

Planning equilibrium growth

UGDP values for each year for a twelve-year period from 2010 till 2022 is given below.

Table 17: Final UGDP values

UGDP Values			
Year	(USD mn)	Year	(USD mn)
2010	62717503	2017	74579924
2011	69649058	2018	78198087
2012	71117633	2019	79284952
2013	73023357	2020	81096393
2014	73850628	2021	84719276
2015	74093727	2022	95587923
2016	74215276		

Plan of action

The table gives an idea of the UGDP value at periodic intervals. All that needs to be done is to ensure that the UGNRP values at the corresponding intervals match the UGDP values. The close match of UGNRP value with UGDP value will ensure that the "zero difference" mission is well on course.

CONCLUSIONS

The outcome of this empirical research is three-fold:

1. New economic concepts:
   - GNRP: Economic growth potential indicator based on natural resource evaluation
   - UGDP: Cumulative wealth productivity of nations
   - UGNRP: Cumulative resource-based valuation of nations

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2. New Mechanisms:
   - Common Pricing mechanism
   - Conversion factor for physical measurement parity
3. New Innovative Systems:
   - Economic-Environmental Equilibrium point of macro-constancy
   - Wealth Redistribution model
4. The Final outcome of the research process is:
   - Economic-Environmental Equilibrium (E3) econometric model
   - Wealth Redistribution model (WRM) [20][21][22]

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