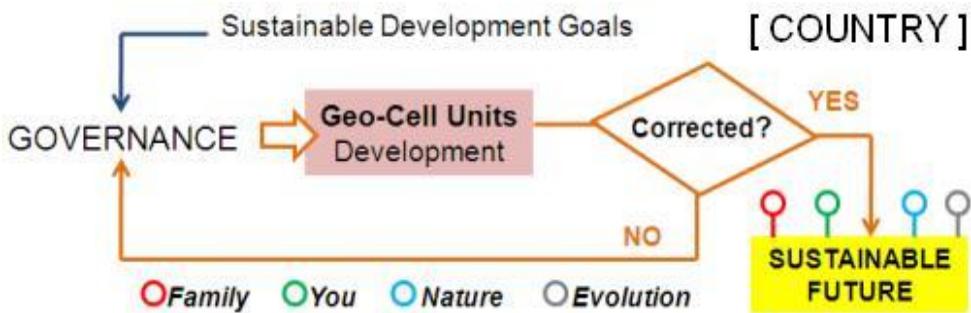


## A New Insight on Governance for a Sustainable Future

Krishnendu Sarkar\*

### ABSTRACT

A model architecture is presented to classifying the development of geographical cells, using a hypothetical vulnerable geographic cell XYZ, as a case, for better governance of sustainable development and environmental sustainability goals that have been with weak indicators and thereby prone to detrimental outcomes threatening the human-nature co-existence. The computation for the classification had innovatively targeted the entities of *family*, *you*, *nature*, and *evolution* and its 177 attributes for development-gap analysis and correction. It provoked a fresh hypothesis to governance, which got constructed in form of *fyne* governance for vulnerability resilience and mechanisms that would lead to the assurance of a sustainable future, where, *fyne* entities as a composite would quantify the overall fitness of habitat or geographic cell in the context of sustainable development goals 2030.



**Keywords:** Development Classification, Governance; Sustainable Development, Sustainable Future, Geographic Cell, Vulnerability

## INTRODUCTION

The sustainable development goals despite global alliances and national mandates were far from satisfactory in terms of its desired outcomes. To counter that a fresh insight on governance got laid with the classification of development of a geographical unit or cell, that makes a government unit. The computation for the classification involved the entities of *family*, *you*, *nature*, and *evolution (fyne)* meant to get graded as ‘underdeveloped’, ‘developing’, and ‘developed’ geographical cells (Geocell). Where, it will be imperative to attain higher classification grades to combat various vulnerabilities and sustain desired developments.

**The Questions.** Can the poor nations with rich bio-diversity leave their wealth of nature unexploited for the cause of global environmental concerns? How do those nations walk the quote “there is no Plan B; because we do not have a Planet B” (Ban Ki-moon, 2014)? How do they confront the challenges or pressures to sustain human civilization with cohesive inter-relationships of social, economic, and environmental development? In the want of acceptable answers, how can they prosper and progress without addressing their social, cultural, economic, and environmental vulnerabilities? Those were some of the research questions that led us to hypothesize a novel model of governance. It stemmed from empirical pieces of evidence that will be imperative for nations to reverse the degradation of biodiversity and restore the environment within and also beyond geopolitical boundaries for the sake of a sustainable future (Toynbee, 1987; Sachs, 2015). Furthermore, that families as units of society have to be valued and nurtured, and living within environmental limits would entail the involvement of family, self, enterprise, and society for the effective usage of natural resources and its future security (Desforges, 2003).

## LITERATURE STUDY

***Sustainable Development and Environment Sustainability.*** From the study of various literature (Kates et.al, 2001; Meadows, 1972;

Brundtland,1987; Bunge 2012) it was evident that Sustainable Development (SD) is meant to ensure equal opportunity, cohesion, and inclusion of existing and future communities and to ensure that natural resources are unimpaired and Environment Sustainability (ES) is an integral part of SD that is associated to factors like, renewable resources, energy conservation, resources efficiency, smart homes and habitats, emissions control, sustainable agriculture and forestry, livelihoods, natural resources protection, waste management, etc. The Earth's finite resources and human population growth and its uncontrolled developmental urges need to be controlled within limits that meet the needs of the present without compromising the ability of future generations to meet their own needs. However, the Climate Agreements to reduce (carbon) emissions had little to show on the ground, and other non-polluter regions suffered due to the environmentally adverse by-products of certain business activities of other polluter regions. While the 2030 Agenda for SD got adopted with its 17 goals the ES is still captive to a political boundary for its discretionary use or misuse.

***Poverty, Politics, Governance & Development.*** The health impacts of noncompliance to SD goals and ES most adversely affect the poor and further restricts their chances to rise out of poverty and often expose them to greater vulnerability of natural and man-made development hazards (Kaya 1997). The relationships among health, poverty, and environment are complex and one global solution to ES may not fit all, because right from the base of the societal pyramid and upwards there is a disparity in income; its opportunities, and thereby a disparity in quality of the human development. Besides, in addition to enforcing their legislation, the governments need to create an investment policy that will incentivize ES outcomes. Good governance has to involve participation right from the villages to the district, and from district to the state and country with optimal allocation of funds, its timely release, and its fair utilization (Stojanovic 2016). While it may be true that the interfaces and interactions within and among the citizens, governments, and businesses vary from region to region, and decisions are usually influenced by the physical, economic, social, and political environments at the local levels, still

governments have to prioritize needful remedial actions to live within the set environmental limits (Gorbachev 2006).

## **OBJECTIVE**

To provide a fresh perspective into the development of self, enterprise, society, economy, and vulnerability control as one of the major areas of focus. And, to offer a computational approach to governance of development.

## **METHOD**

*Fyne* Framework for Governance – A design hypothesis for management of SD

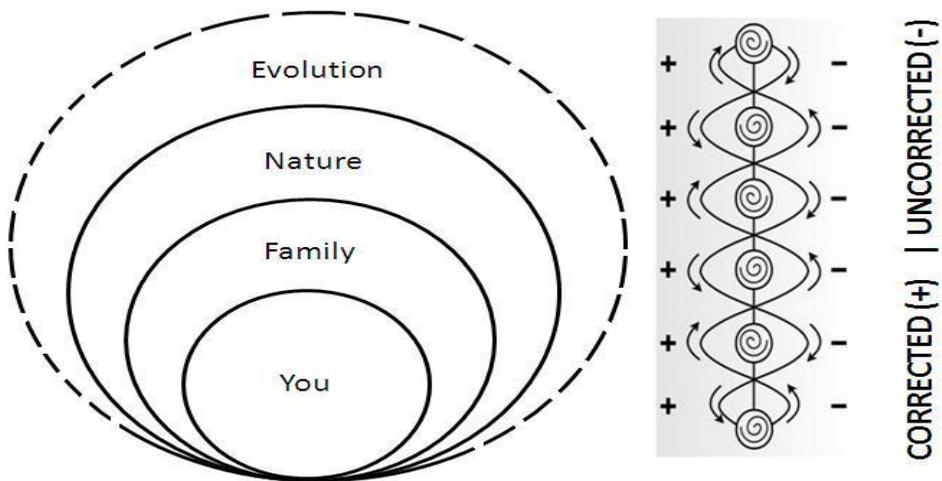
### ***Fyne: Entities and Relationships***

*Fyne* was construed as an abbreviated term for this investigation with presumably four development entities of sustainable future, namely: *Family, You, Nature, and Evolution (societal)*. Where *Fyne* as a composite word would attempt to quantify the overall fitness of habitat in the context of SD.

***Family.*** The entity of Family (see Table 1) was defined with five sub-entities of, Domicile (A), Livelihood (B), Lifestyle (C), Empowerment (D), and Entertainment (E) along with an indicative set of attributes to help map its evolution over time and to broadly understand the societal trajectory with deviation  $d$  from its previous states. The challenge would be to ascertain the causation of  $d$  and its resultant change  $c$  and its influence on development  $D$ . Since the last few decades the average life expectancy, speed of progress, potential of earnings, access to education, health, livelihood, lifestyle, etc. have all increased manifold, the  $d$  and  $c$  would likely be changing fast. So it will be difficult to predict the year 2030 of a typical family of today. A Family must be seen as a vital socio-ecco-politico-cultural unit for local to global development, it will be therefore important to regulate the  $d$  and  $c$  for SD.

**You.** The entity of You, was seen as the driver and the binder entity of *fyne* with its six sub-entities of Intuition, Logical, Communication, Values, Passion, and Endurance (see Table 2). This entity had evolved with Family with a spiral of ongoing change. The entities of Family and You were supposed to be in relationships within a societal ecosystem and were considered in this investigation as You<sup>S</sup> (You Set) involving the human leadership aspects of *Self*, *Enterprise*, and *Society*. The outcome of human-nature actions based on the actions of self, enterprise, and society will eventually affect the entity of Nature, its ecosystem, which in turn shall affect the entity of Evolution, of society (see Figure 1). You<sup>S</sup> will rationally and optimally drive the use of resources for development and growth.

**Figure 1: The Cycle of F-Y-N-E and inter-relationships**



**Nature.** Nature is the natural, physical and material world or the universe in the broadest sense. It can refer to the phenomena of the physical world and the living world in general. For this investigation, the entity of Nature limited itself to the ecosystem; which would entail a variety of abiotic (non-living) and biotic components (living). Human activity has affected the entity of Nature (Stern, 2009) and one such indicator is Anthropogenic Global Warming (AGW) and coping with its challenges

was an onerous task for scientists and economists (Nordhaus, 1994). The responsibility is designed to rest on You<sup>S</sup> to mitigate Nature's vulnerability forms (see Table 3), concerning climate-change-related anomalies and sustain the climate-sensitive sectors such as agriculture, forestry, water, and land-use. About hazards and disasters, the vulnerability was linked to the relationship that people have with their environment. It referred to the inability to withstand the effects of a hostile environment. It can be said that with SD actions from local to global levels the vulnerability can be managed and controlled to a significant extent.

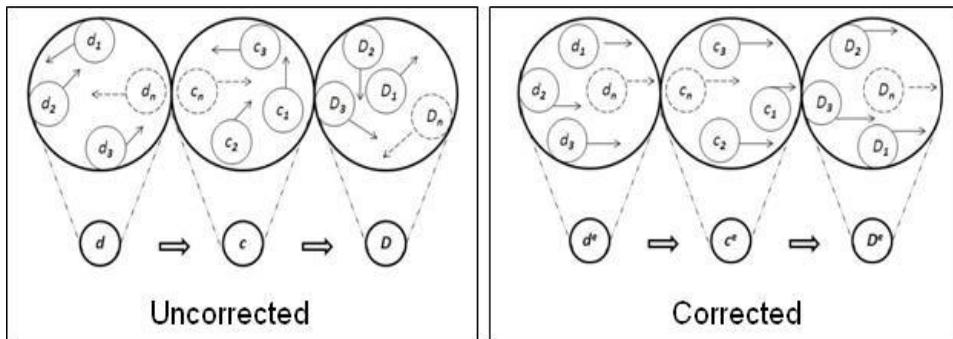
***Evolution (Societal).*** The scope of Evolution (see Table 4) was limited to societal structures, institutions, and cultures that have paved the way for civilizations and their future. The indigenous characteristics of civilization; culture, customs, ideology, polity, labor, markets, social structures, security, etc. gradually assimilated more the characteristics of powerful civilizations, always with an urge to have the power to exercise control over nature and other human beings. With political boundaries; the civilized world became a composition of nations. Nations race to attain or retain supremacy over other nations; its nature; its people; its markets have all influenced the entity of Evolution. Its sub-entity Transfer was meant to ensure that the wheel of Evolution progressively moves on the right path towards a sustainable future. That as a baton to be passed from one generation to another and this will continue in the cycle of *fyne*, where its entity of Family would transfer its values to the entity of You, You to You<sup>S</sup>, You<sup>S</sup> to the entity of Nature, and finally to the entity of Evolution. That will be how the *fyne* cycle was conceptualized to collectively and correctively evolve.

### ***Fyne Correction***

The *d* patterns of Family will help gauge the deviations in social interactions, social group sharing in limited geography or social territory, typically subject to the same political authority and dominant cultural expectations. Societal evolution can be analyzed in the patterns of relationships between individuals who share a distinctive culture with

institutions. The fact of the matter is that the development trends and their influence on societal evolution would require a correction (see Figure 2) of its uncorrected part with a random array of  $d$ ,  $c$ , and  $D$  vectors, where families, as societal units, are not in sync with the SD goals. The random array of  $d$  and  $c$ , in both abiotic and biotic components of Nature, can add to vulnerability and even impair societal evolution and human civilization. The *fyne* correction for SD will signify that a nation can address SD goals at its local levels. Then only the effective deviation  $d^e$  with its directional parity to goals will be expected to bring in effective change  $c^e$  and in turn, the directional parity of  $c^e$  to goals will bring the desired correction as effective development  $D^e$ . The consistency in  $D^e$  compliances at local levels and its integration at wider levels shall lead to SD. This adherence to corrective pursuits in minimizing the vulnerability to the extent possible shall lead to a corrected societal evolution. A small country like Bhutan was a big example for us, because, it had its  $D^e$  aligned for low-carbon driven climate-resilient development.

**Figure 2: Fyne Corrections**



Source: Author

### ***Fyne Governance***

Fyne Governance (*FyneGov*) got conceptualized to mitigate the vulnerabilities and to sustain the desired change and progress of *fyne* entities and their attributes, as the next practice of good governance. Good governance has to encourage decentralized planning with participatory,

consensus-oriented, accountable, transparent, responsive, effective and efficient, equitable, and inclusive approaches (Goldman, 2010). Besides, it has to ensure freedom from corruption and exploitation on one hand and empowerment of all to uphold the people's participative spirit with righteousness and justness.

### ***Geo-Cell as a unit of FyneGov.***

The evidence of *FyneGov* will be in the transformation of an underdeveloped geo-cell (geographic cell) to a developed geo-cell and the onward sustainability of its *fyne* entities and its attributes. Each such geo-cell, therefore, needs to be classified on stipulated development parameters for the good governance of *fyne* (see Table 5). Metrics like NAS shall be required to classify geo-cells as underdeveloped or as developing or as developed using benchmarked computational techniques for *FyneGov* for quantifiable assurance on sustainable future. Further, each of the parameters would have to get assessed against benchmarks and assigned scores under its Aspect (see Table 6 and Table 7). Based on the geocell's priority the parameters have to be relatively weighted in a total weight of 1,  $\sum W_i=1$ , and similarly for the six Aspects as well, where  $\sum W_j =1$ .

Moreover, each parameter needs to be further broken into measurable sub-parameters along with its percentage distribution  $W_k$  as per relative influence (weight), where the total of  $W_k$  under each parameter will be 100%,  $\sum W_k=100$ . Against each  $W_k$  the compliance percentage  $C_k$  has to be then marked based on the actual on-ground status. This will be how the final computation of NAS will get carried out (see Appendix).

### ***Steps for Computation of Parameter Score (PS), Aspect Score (AS), and NAS***

1. Sub-Parameters are to be listed under each parameter (see Table 6 and Table 7).
2. Say, the  $W_k$  of a Sub-Parameter Global Growth Sustainability is 30 (in a percentage scale of 100) against Parameter Per-Capita Income

under Aspect Self for an XYZ geo-cell then how its C<sub>k</sub> gets marked?

3. C<sub>k</sub> value of sub-parameter Global Growth Sustainability has to be appropriated based on sub-parameters percentage compliance vis-a-vis various development indices that are globally acceptable like Human Development Index (HDI), Industrial Production Index (IPI), Gross National Product (GNP), Gross Domestic Product (GDP), Environmental Performance Index (EPI), ICT Development Index (IDI), Census, etc. Appropriate IT systems have to be in place to provide the analytics and even automatically return the estimated C<sub>k</sub> values.
4. Say, the percentage compliance of that sub-parameter is targeted as 77.5%. Then its C<sub>k</sub> shall be calculated as 77.5% of W<sub>k</sub> of global growth sustainability; which will be  $77.5/100 * 30 = 23.25$
5. Likewise, all the C<sub>k</sub> values of each of the sub-parameters will be ascertained to get the PC (Parameter Compliance)
6. The CG (Compliance Grade) will get calculated in a grade of 4 for each parameter using the formula,  $PC/100 * 4$
7. The PS will get calculated as;  $CG * W_i$ .
8. AS will get calculated as;  $\sum PS * W_j$ .
9. Finally, NAS will get derived by adding all the six AS as;  $\sum AS_{1-6}$

### ***A Hypothetical XYZ Geo-Cell Case***

Using the method as stated above, the parameter-wise C<sub>k</sub> and the NAS of an XYZ vulnerable geo-cell was computed as an example under *FyneGov*. The C<sub>k</sub>, BP, W<sub>i</sub>, W<sub>j</sub>, and W<sub>k</sub> values were at the most assumptions on XYZ vulnerabilities typical to a multi-hazard geocell (UNDP, 2017). Based on that the NAS obtained was 2.54, indicating the XYZ's 'Developing' status of BB, which has to improve to 'Developed status' of at least AA by 2030, with a NAS value in the range closer to 4.0, of say, 3.41-3.79, in line with mandated SD Goals. For that, XYZ has to target for at least a high C<sub>k</sub> of 85 percent on an average for each of the Parameters. And, it will be how the *FyneGov* model would facilitate ascertaining and implement conducive and cogent actions to deliver on SD Goals 2030. The

dashboard of *FyneGov* for all geographical cells under the government's purview can be considered for trials and needful acceptance to achieve the national SD mandates using digital means till the last mile. The government at all levels must be accountable for the mandated realization of goals, where a national IT system can be of immense help for transparency in governance, right to local-development and information, decentralized planning, allocation, monitoring, evaluation, decision-support, and communication.

## **DISCUSSIONS AND CONCLUSION**

*Fyne's* concept to the governance of development is expected to promote inquiries and empirical evidence-based studies and trials for further modeling of *FyneGov* for effective SD and ES. The sustainable goals and climate goals have been failing on their implementation deadlines since the last few decades due to lack of transparency and urgency from political governments, rampant political conflicts, and increasing acts of violation of peace; limits of growth and development. It is in this context that the discussions would be important to effectively comply with SD goals 2030. The perspective of *fyne* can act as a meaningful provocation to design solutions to resolve the conflicts of man-made development with the laws of nature. For example, all geo-cells with below-par NAS classifications, indicating high vulnerabilities, can enact a definitive development mechanism improving its NAS grade closer to AA by 2030? Besides, the *FyneGov* model architecture is expected to provide scope for meaningful prospects for research scholars, educators, entrepreneurs, scientists, technologists, planners, development professionals, policymakers, advocacy groups, institutions, governments, and inter-governmental agencies to deliberate and deliver innovative ways to combat various vulnerabilities at local, regional and global levels. The correction on *fyne's* development-gaps in all geo-cells would be important for a sustainable future of the world.

The development classifications for geographical cells will provide a dynamic dashboard for governance backed by an integrated decision-support system. That way, government, international governments, and other development agencies can prioritize their resource allocation and its timely utilization for vulnerability mitigation and sustainable development either for a particular geographic cell or for a cluster of cells and finally, covering the entire nation. Aside, it can extend its coverage beyond national boundaries and add to the web of *fyne* development data and gap-analysis to --a) comprehensively describe what all has happened with the development of a particular national or transnational Geo Cell or clusters, b) to prescribe for corrective actions and c) predict on vulnerability that will compel governments to take preventive and resilient measures. The *FyneGov*, in its tested and trusted form, is expected to promote coordinated policies, strategies, and convergent actions on vulnerability correction and inclusive development. Besides, it will help prioritize locally, alert globally and ensure optimal movement of resources among the geo-cells to address the development needs and vulnerability control of *fyne* entities and their attributes, especially in areas with poor NAS grades. It can be expected that national governments take justifiable actions to tax more the uncorrected-SD economic activities, enact trade treaties based upon the emission caps, augment the forest areas, restrict carbon-intensive industries, prohibit the killing of wild animals, ration energy, enforce standards on energy efficiency, fund alternative energy production, control the population levels, invest more on mass transit systems and many other such effective *fyne* development steps.

**Declaration on Conflict of Interest:** None.

## Appendix

### Computation of NAS for an XYZs Geo-Cell Case

Step 1: Parameter-wise  $C_k$  computation

Sub Code	CODE 0101: PER-CAPITA INCOME			Sub Code	CODE 0102: AVERAGE AGE		
	SUB-PARAMETER	$W_k$	$C_k$		SUB-PARAMETER	$W_k$	$C_k$
01	Per Capita Income Sustainability	35	19.50	01	Population below 30 years	60	27.5
02	GDP Growth Sustainability	30	23.25	02	Population above 30 till 60 years	25	16.25
03	Population Sustainability	35	12.75	03	Population above 60 years	15	9.50
<b>Total</b>		<b>100</b>	<b>55.50</b>	<b>Total</b>		<b>100</b>	<b>53.25</b>
CODE 0103: GENDER EQUITY				CODE 0104: LITERACY			
01	%age women married above 18 yrs	15	10	01	Average Literacy > 80%	45	22.75
02	%age women in organized sector	60	27.50	02	Gross Enrolment Ratios > 30	30	15
03	%age women in unorganized sector	25	16.50	03	100% Internet Access	25	5.25
<b>Total</b>		<b>100</b>	<b>54.00</b>	<b>Total</b>		<b>100</b>	<b>43.00</b>
CODE 0105: LIFE EXPECTANCY				CODE 0201: AGRICULTURE			
01	Average Longevity > 75 years	35	29.25	01	Integrated farm practices >30%	40	28.25
02	Crude Death Rate < 7	35	29.50	02	Traditional practices sustained	30	27.50
03	Healthcare access for all	30	26.25	03	Ground water control	30	25.75
<b>Total</b>		<b>100</b>	<b>85.00</b>	<b>Total</b>		<b>100</b>	<b>81.50</b>
CODE 0202: INDUSTRY				CODE 0203: HOUSING			
01	Jobs led growth	40	23.75	01	Access to housing loan for all	40	27.25
02	Jobless growth	20	18.25	02	Low cost housing schemes	25	21.75
03	Environmental Compliance	40	28.75	03	Urban amenities in rural areas	35	16.25
<b>Total</b>		<b>100</b>	<b>70.75</b>	<b>Total</b>		<b>100</b>	<b>65.25</b>
CODE 0204: TRANSPORT				CODE 0205: LAND USE			

01	Non-fuel based > 35%	40	28.75	01	Coastal area S <sup>N</sup>	25	17.50
02	GHG emission control > 85%	35	26.50	02	Marine / Blue Economy S <sup>N</sup>	35	21.25
03	Energy efficient vehicles > 70%	25	16.00	03	Terrestrial area S <sup>N</sup>	40	14.25
<b>Total</b>		<b>100</b>	<b>71.25</b>	<b>Total</b>		<b>100</b>	<b>53.00</b>
SC	CODE 0301: HABITAT DIVERSITY			SC	CODE 0302: DIGNITY		
01	Coastal habitat management	30	19.75	01	Quality of Life: Human	40	27.75
02	Marine habitat management	35	29.00	02	Quality of Life: Animals	30	19.00
03	Terrestrial habitat management	35	21.00	03	Quality of Life: Plants	30	21.25
<b>Total</b>		<b>100</b>	<b>69.75</b>	<b>Total</b>		<b>100</b>	<b>68.00</b>
SC	CODE 0303: VULNERABILITY CONTROL			SC	CODE 0304: ENERGY		
01	Vulnerability Assessments- Disaster Management	30	25.00	01	Renewable Energy Maximization	35	17.00
02	S <sup>N</sup> Goals Compliance	40	22.25	02	Energy Use Optimization	30	18.75
03	CoV Maximization (CoV <sub>max</sub> )	30	25.00	03	Energy Efficiency Maximization	35	22.25
<b>Total</b>		<b>100</b>	<b>72.25</b>	<b>Total</b>		<b>100</b>	<b>58.00</b>
SC	CODE 0305: ECOLOGY			SC	CODE 0401: PRODUCTION		
	SUB-PARAMETER	W <sub>k</sub>	C <sub>k</sub>		SUB-PARAMETER	W <sub>k</sub>	C <sub>k</sub>
01	Restoration	40	20.50	01	Farm-Based Value Products	30	17.50
02	Augmentation	20	09.25	02	Non-Farm Based Value Products	25	19.00
03	Preservation	40	19.25	03	Economies of Scale	45	28.50
<b>Total</b>		<b>100</b>	<b>49.00</b>	<b>Total</b>		<b>100</b>	<b>65.00</b>
SC	CODE 0402: DISTRIBUTION			SC	CODE 0403: CONSUMPTION CONTROL		
01	Channel Integration	25	21.50	01	Per Capita Waste Minimization	40	35.25
02	Ethical and Fair Practices	30	18.50	02	Demand Chain Optimization	35	25.50
03	Supply Chain: Loss Prevention	45	23.25	03	Human Population Management	25	17.50

<b>Total</b>		<b>100</b>	<b>63.25</b>	<b>Total</b>		<b>100</b>	<b>78.25</b>
SC	CODE 0404: WEALTH GENERATION			SC	CODE 0405: POLICY		
01	Waste to Wealth	25	00.75	01	PCSD (Policy Coherence for Sustainable Development) Goals	30	14.00
02	Environmental Assets	35	22.50	02	Financials for PCSD	35	17.25
03	Human Assets	40	16.75	03	Inclusive Development	35	13.75
<b>Total</b>		<b>100</b>	<b>40.00</b>	<b>Total</b>		<b>100</b>	<b>45.00</b>
SC	CODE 0501: CCC			SC	CODE 0502: PJA		
01	Climate Data Management	25	12.25	01	Human-Human Conflict Control	35	33.00
02	CCC Decision Support System	30	14.00	02	Human-Nature Conflict Control	35	33.00
03	Climate Smart Activities	45	22.50	03	Accountability and Justice	30	24.00
<b>Total</b>		<b>100</b>	<b>48.75</b>	<b>Total</b>		<b>100</b>	<b>90.00</b>
SC	CODE 0503: GLOBAL PARTNERSHIPS			SC	CODE 0504: FOSTER INNOVATION		
01	Global Value Chains	30	21.75	01	Green Development Alternatives	35	26.00
02	Global Environment Funds	35	29.75	02	Clean Development Alternatives	30	24.25
03	Global Development Funds	35	26.00	03	Lean Development Alternatives	35	24.75
<b>Total</b>		<b>100</b>	<b>77.50</b>	<b>Total</b>		<b>100</b>	<b>75.00</b>
SC	CODE 0601: EMPOWERMENT			SC	CODE 0602: ETHICS		
01	Capacity Building & Self-Help	35	29.25	01	Traditional & Family Values	35	29.50
02	Freedom, Choice and Decision	35	30.25	02	Culture and Social Festivities	35	32.75
03	Women & Child Development	30	21.75	03	Responsible Business Conduct	30	22.75
<b>Total</b>		<b>100</b>	<b>81.25</b>	<b>Total</b>		<b>100</b>	<b>85.00</b>
SC	CODE 0603: SECURITY			SC	CODE 0604: TRANSFER		
01	Health and Education	30	22.50	01	You <sup>S</sup> and S <sup>N</sup> Best Practices	35	10.25
02	Livelihood, Food &	30	17.50	02	Human-Nature Co-	25	14.75

	Nutrition				existence		
03	Intellectual, Physical, Natural, Digital	40	26.25	03	Happiness	40	21.25
<b>Total</b>		<b>100</b>	<b>66.25</b>	<b>Total</b>		<b>100</b>	<b>46.25</b>

Step 2.1: You<sup>S</sup> Leadership Computation of NAS

You <sup>S</sup>	Code	Parameter	$W_i$ ( $\sum W_i=1$ )	Parameter Compliance (C)	Compliance Grade CG (C in Scale of 4) ( $C*4$ )/100	PS = (CG * $W_i$ )
Self	0101	Per-Capita Income	0.18	55.50%	2.22	0.40
	0102	Average Age	0.24	53.25%	2.13	0.51
	0103	Gender Equity	0.18	54.00%	2.16	0.39
	0104	Literacy	0.25	43.00%	1.72	0.43
	0105	Life Expectancy	0.15	85.00%	3.40	0.51
	Aspect Code : 01 $W_j = 0.19$					$\sum PS = 2.3$
<b>Aspect Score (01) = <math>\sum PS * W_j = 0.44</math></b>						
Enterprise	0201	Agriculture	0.19	81.50%	3.26	0.62
	0202	Industry	0.18	70.75%	2.83	0.51
	0203	Housing	0.18	65.25%	2.61	0.47
	0204	Transport	0.20	71.25%	2.85	0.57
	0205	Land Use	0.25	53.00%	2.12	0.53
	Aspect Code : 02 $W_j = 0.18$					$\sum PS = 2.7$
<b>Aspect Score (02) = <math>\sum PS * W_j = 0.49</math></b>						
Society	0301	Habitat Diversity	0.19	69.75%	2.79	0.53
	0302	Dignity	0.18	68.00%	2.72	0.49
	0303	Vulnerability Control	0.18	72.25%	2.89	0.52
	0304	Energy	0.22	58.00%	2.32	0.51
	0305	Ecology	0.23	49.00%	1.96	0.45
	Aspect Code : 03 $W_j = 0.17$					$\sum PS = 2.5$
<b>Aspect Score (03) = <math>\sum PS * W_j = 0.42</math></b>						

Step2.2: SD Leadership Computation of NAS

SD	Code	Parameter	$W_i$ ( $\sum W_i=1$ )	Parameter Compliance (C)	Compliance Grade CG (C in Scale of 4) ( $C*4/100$ )	PS = (CG * $W_i$ )	
Economics	0401	Production	0.15	65.00%	2.6	0.39	
	0402	Distribution	0.15	63.25%	2.53	0.38	
	0403	Consumption Control	0.25	78.25%	3.13	0.78	
	0404	Wealth Generation	0.20	40.00%	2.00	0.40	
	0405	Policy	0.25	45.00%	1.80	0.45	
	Aspect Code : 04 $W_j = 0.17$					$\sum PS = 2.4$	
	Aspect Score (04) = $\sum PS * W_j = 0.41$						
Common Goals	0501	Combat Climate Change (CCC)	0.35	48.75%	1.95	0.68	
	0502	Peace, Justice, Accountability (PJA)	0.25	90.00%	3.60	0.90	
	0503	Global Partnerships	0.15	77.50%	3.10	0.47	
	0504	Foster Innovation	0.25	75.00%	3.00	0.75	
	Aspect Code : 05 $W_j = 0.15$					$\sum PS = 2.8$	
	Aspect Score (05) = $\sum PS * W_j = 0.42$						
Evolution	0601	Empowerment	0.20	81.25%	3.25	0.65	
	0602	Ethics	0.20	85.00%	3.40	0.68	
	0603	Security	0.20	66.25%	2.65	0.53	
	0604	Transfer	0.40	46.25%	1.85	0.74	
	Aspect Code : 06 $W_j = 0.14$					$\sum PS = 2.6$	
Aspect Score (06) = $\sum PS * W_j = 0.36$							
<b>NAS = <math>\sum AS_{(01-06)} = 0.44+0.49+0.42+0.41+0.42+0.36 = 2.54</math></b>							
<b>Geo-Cell Classification Case: Developing (Grade BB)</b>							

**Table 1: Family**

Sub-Entity	Attributes
<b>A</b>	Rural <sup>1</sup> , No Electricity <sup>2</sup> , Bare Minimum Civic Amenities/Utilities <sup>3</sup> , Joint Families <sup>4</sup> , Local Governance <sup>5</sup> , Rich Biodiversity <sup>6</sup> , Clustered by Avocations/ Social Status <sup>7</sup> , Semi-Urban <sup>8</sup> , Electricity <sup>9</sup> , Moderate <sup>3,4,5,6,7</sup> , Urban <sup>10</sup> , Available <sup>3</sup> , Depletion <sup>4,5,6,7</sup> , Modern Infrastructure <sup>11</sup> , Organized Governance <sup>12</sup> , Very Moderate <sup>6,7</sup> , Global <sup>13</sup>
<b>B</b>	Agriculture <sup>14</sup> , Fishery <sup>15</sup> , Animal Husbandary <sup>16</sup> , Forestry <sup>17</sup> , Handicrafts <sup>18</sup> , Traditional Business <sup>19</sup> , Self-Help Avocations <sup>20</sup> , Dominant Gender Male <sup>21</sup> , Skills Based <sup>22</sup> , Non-Farm <sup>23</sup> , Moderate <sup>16,17,18</sup> , New Business <sup>24</sup> , Gender Female <sup>25</sup> , Migration <sup>26</sup> , Industrial <sup>14,15,16,18, 19, 20, 22, 23, 24</sup> , Knowledge Based <sup>27</sup> , Technology <sup>14,15, 20, 22, 23, 27</sup> , Gender Equity <sup>28</sup>
<b>C</b>	Traditional Clothing, Food, Culture, Arts, Architecture, Language, Customs <sup>29</sup> , Local Markets & Goods <sup>30</sup> , God Fearing & Superstitious <sup>31</sup> , Domesticated Animals <sup>32</sup> , Needs Driven <sup>33</sup> , Ethics & Integrity <sup>34</sup> , Human-Nature Bonding <sup>35</sup> , Peace & Happiness Driven <sup>36</sup> , Resistance to Change <sup>37</sup> , Majorly <sup>29</sup> , Slow Erosion <sup>30, 31, 32, 33, 34, 35, 36, 37</sup> , Regional/National Markets & Goods <sup>38</sup> , Commoditification <sup>39</sup> , Accommodation of New -- Clothing, Culture, Language, Customs <sup>40</sup> , Fine Dining <sup>41</sup> , Sparsely <sup>29,33,34,35,36,37</sup> , Amalgamation <sup>30, 31,35</sup> , Global Markets & Goods <sup>42</sup> , Advent of Luxury <sup>39</sup> , Widespread <sup>40</sup> , Modern Public and Private Transport <sup>43</sup> , Rarely <sup>29,33,34,35,36,37,38</sup> , Global <sup>39,40,41,43</sup> , Glitz and Glamour <sup>44</sup> , Want/ Market Driven <sup>45</sup> , Problem of Plenty <sup>46</sup>
<b>D</b>	Informal <sup>47</sup> , Moral <sup>48</sup> , Formal Education (School, University) for Haves <sup>49</sup> , Poor Access for Havenots <sup>50</sup> , Philosophy, Religion & Spirituality <sup>51</sup> , Traditional Vocational Know-hows <sup>52</sup> , Enquiry & Experimentation <sup>53</sup> , Wider Access <sup>49</sup> , 51, 52, 53, Multidisciplinary <sup>54</sup> , New Skills & Knowledge <sup>55</sup> , Gender Inclusive <sup>56</sup> , Policy Driven <sup>57</sup> , Collaborative Development (Content, Methods & Materials) <sup>58</sup> , Advent of Technology in Education <sup>59</sup> , Proliferation of Professional Programs <sup>60</sup> , New Jobs Creation <sup>61</sup> , Modern Technology Enabled <sup>62</sup> , Access to Global Resources <sup>63</sup>
<b>E</b>	Indigenous Performing Arts, Music, Sports and Culture <sup>64</sup> , Community Fairs, Festivals, Fete, and Other Celebrations <sup>65</sup> , Localized <sup>66</sup> , Limited Mediums <sup>67</sup> , De-Localized <sup>68</sup> , Improved availability of Machines and Machinery <sup>69</sup> , Commoditization <sup>70</sup> , Multiple Mediums <sup>71</sup> , Growth of Entertainment as Industry <sup>72</sup> , Globalized <sup>73</sup> , Technology-aided <sup>74</sup> , Private (digital) Screen <sup>75</sup>

A: Domicile, B: Livelihood, C: Lifestyle, D: Empowerment, E: Entertainment

Source: Author

**Table 2: You**

Sub-Entity	Attributes
Logical	Intelligence Quotient <sup>76</sup> (IQ), Scientific Methods <sup>77</sup> , SMART <sup>78</sup> (Specific, Measurable, Achievable, Relevant, Time-oriented) Goal Setting, Tangible Actions <sup>79</sup> , Tangible Metrics <sup>80</sup> (Cost Optimization, Benefit Maximization)
Intuition	Emotional Quotient <sup>81</sup> , SMART Ideas <sup>82</sup> Goal Setting, Lateral Thinking <sup>83</sup> , Design Thinking <sup>84</sup> , Disruptive Innovation <sup>85</sup>
Communication	Verbal <sup>86</sup> , Non-Verbal <sup>87</sup> , Design Motivation <sup>88</sup> , Fellowship <sup>89</sup> , Relationship <sup>90</sup> , Leadership <sup>91</sup>
Values	Spiritual Quotient <sup>92</sup> (SQ), Social <sup>93</sup> , Cultural <sup>94</sup> , Morality/ Ethics <sup>95</sup> , Integrity <sup>96</sup> , Patience <sup>97</sup> , Humble <sup>98</sup>
Passion	Walk-the-Motivation <sup>99</sup> , Positive Attitude <sup>100</sup> , Non-Complacent <sup>101</sup> , To-Do-Will <sup>102</sup>
Endurance	Physical Fitness <sup>103</sup> , Mental Fitness <sup>104</sup> , Mobility <sup>105</sup> , Tenacity <sup>106</sup> , Self-Support <sup>107</sup> , Adaptability <sup>108</sup> , Survival-Ability <sup>109</sup>

Source: Author

**Table 3: Nature (Ecosystem)**

Sub-Entity	Attributes	Vulnerability (V) forms
Abiotic	Water <sup>110</sup> , Sunlight <sup>111</sup> , Radiation <sup>112</sup> , Temperature <sup>113</sup> , Humidity <sup>114</sup> , Atmosphere <sup>115</sup> , Soil <sup>116</sup> (earth)	Flood, Soil erosion, Water table depletion, Drought, Climate-change, Cyclones, earthquake, landslide, global-warming, Sea level rise, Afforestation, Hazardous waste, pH of water, pH of the soil, Fossil fuel depletion, Greenhouse gases, pollutants (air, water, and soil), UV radiation, etc.
Biotic	Plants <sup>117</sup> , Animals <sup>118</sup> , Fungi <sup>119</sup> , Bacteria <sup>120</sup>	Marine biodiversity depletion, coastal and other terrestrial biodiversity depletion, Habitat diversity disruption, migration, endangered species, diseases, epidemics, food-chain disruptions, Poverty, Gender justice, living world relationships (Human-Human, Human-Plant, Human-Animal, Human-Wilderness ) conflict with laws of Nature, Profit above people and planet, unnatural bio-techniques, etc.

Source: Author

**Table 4: Evolution (Societal)**

Sub-Entity	Attributes
Empowerment	Values & Ethics <sup>121</sup> , Education <sup>122</sup> , Self-help <sup>123</sup> , Tolerance <sup>124</sup> , Arts <sup>125</sup> , Entertainment <sup>126</sup> , Decision <sup>127</sup> , Choice <sup>128</sup> , Family Planning <sup>129</sup> , Gender Equity <sup>130</sup> , Rights & Duties <sup>131</sup> , Control <sup>132</sup> , Advocacy <sup>133</sup> , Creativity & Innovation <sup>134</sup> , Communication <sup>135</sup> , Correction <sup>136</sup> , Governance <sup>137</sup>
Economy	Information <sup>138</sup> , Knowledge <sup>139</sup> , Land-use <sup>140</sup> , Marine-use <sup>141</sup> , Income <sup>142</sup> , Expenditure <sup>143</sup> , Gross Domestic Product Growth <sup>144</sup> , National Debt Control <sup>145</sup> , Housing <sup>146</sup> , Banking <sup>147</sup> , Insurance <sup>148</sup> , Finance <sup>149</sup> , Markets <sup>150</sup> , Trade <sup>151</sup> , Infrastructure <sup>152</sup> , Migration Control <sup>153</sup> , Waste Management <sup>154</sup> , Regulatory Figureworks <sup>155</sup>
Security	Territorial <sup>156</sup> , Social <sup>157</sup> , Political <sup>158</sup> , Cultural <sup>159</sup> , Legal <sup>160</sup> , Food <sup>161</sup> , Water <sup>162</sup> , Soil <sup>163</sup> , Air <sup>164</sup> , Energy <sup>165</sup> , Livelihood <sup>166</sup> , Health <sup>167</sup> , Environment <sup>168</sup> , Cyber-physical <sup>169</sup> , Technological <sup>170</sup>
Transfer (to Gen.Next)	Peace <sup>171</sup> , Happiness <sup>172</sup> , Quality of Life <sup>173</sup> , Disaster Control <sup>174</sup> , Greener Mechanisms <sup>175</sup> , Leaner Mechanisms <sup>176</sup> , Cleaner Mechanisms <sup>177</sup>

Source: Author

**Table 5: Geo-Cell Classification**

Geo-Cell Status (on the scale of 0-4)		Criterion
Status	<b>UNDERDEVELOPED</b>	Net Aspects Score (NAS) = <b>&gt;0 and &lt; 2</b>
D	Highly Unsatisfactory	0.01 - 0.99
C	Unsatisfactory	1.00 - 1.99
Status	<b>DEVELOPING</b>	NAS = <b>&gt;=2 and &lt;3</b>
B	Preparatory	2.00 - 2.30
BB	Partly Progressive	2.31 - 2.69
BBB	Overall Progressive	2.70 - 2.99
Status	<b>DEVELOPED</b>	NAS = <b>&gt;=3 and &lt;= 4</b>
A	SD Assurance Level 1 (Moderate)	3.00 - 3.40
AA	SD Assurance Level 2 (High)	3.41 - 3.79
AAA	SD Assurance Level 3 (Highest)	3.80 - 4.00

Source: Author

**Table 6: You<sup>S</sup> Leadership (Human Aspects) with  $W_i$  and  $W_j$  values of an XYZ Geo-Cell**

<b>Aspect 01: SELF</b>		$W_j$ Self = 0.19
Parameter	$W_i$	BP (Benchmarked Parameter) with the highest score of 4
0101: Per-Capita Income	0.18	USD 12500 average income/person/year
0102: Average Age	0.24	Under 30 years
0103: Gender Equity	0.18	Equal opportunities for all irrespective of sex, caste, faith, age, etc.
0104: Literacy	0.25	100% High School Education for all
0105: Life Expectancy	0.15	75 yrs ( average of male and female)
<b>Aspect 02: ENTERPRISE</b>		$W_j$ Enterprise = 0.18
0201: Agriculture	0.19	100% organic practices, "maximum crop per drop" approaches, balanced soil nutrients, crop diversity, food for all
0202: Industry	0.18	100% compliance on-- a) maximization of livelihoods, b) minimization of pollution, chemicals' risk and waste and c) maximization of resource efficiency
0203: Housing	0.18	Access to proper and affordable housing for poor and weaker sections of society
0204: Transport	0.20	100% compliance on GHG (Green House Gas) emission control, safe and affordable
0205: Land Use	0.25	100% assurance on environment protection in fulfillment of human needs
<b>Aspect 03: SOCIETY</b>		$W_j$ Society = 0.17
0301: Habitat Diversity	0.19	100% protection of the natural range of habitats present in the region (land, water)
0302: Dignity	0.18	Human rights for all
0303: Vulnerability Control	0.18	Vulnerability audits and remedial mechanisms in place to secure all habitats -- physical, natural, digital
0304: Energy	0.22	>70% renewable energy sources, energy conservation and efficiency maximization
0305: Ecology	0.23	Quantifiable evidence on sustainable restoration, preservation, and protection of biodiversity in the region

Source: Author

**Table 7: SD Leadership (Development Aspects) with  $W_i$  and  $W_j$  values of an XYZ Geo-Cell**

<b>Aspect 04 : ECONOMICS</b>		$W_j$ Economics = 0.17
Parameter	$W_i$	BP with a highest Grade of 4
Sum $W_i$ (Predetermined Weightages of Parameters under Aspect) = 1		
0401:Production	0.15	>70% goods transactions/year in the region are with eco-friendly materials and means and are all of value
0402:Distribution	0.15	Supply Chain costs per year < 6% of GDP
0403:Consumption Control	0.25	Waste Generation (kg/capita/day) <1 ; Population Density <150 people/km <sup>2</sup> in terrestrial region,
0404:Wealth Generation	0.20	Rate of Afforestation > Rate of Deforestation, Legislation on Returns on Investment in areas like -- Wealth from Waste, Sustainable Demand and Supply, Cleaner and Safer Water/Air/Soil, Social Entrepreneurship, Corporate Social Responsibility, Linear to Cyclic Industrial Activities, etc.
0405:Policy	0.25	100% Financial Inclusion, Corruption-Free Perception > 80%, Health, Education and Social Security for All
<b>Aspect 05: COMMON GOALS</b>		$W_j$ Common Goals = 0.15
0501:Combat Climate Change	0.35	Strong evidence towards 70% renewable energy by 2030 and 100% by 2050, CO <sub>2</sub> per capita emission < 1.5 t CO <sub>2</sub> by 2030
0502: Peace, Justice, Accountability	0.25	Access for All to Justice, Effective and Accountable Institutions at all levels, Zero tolerance to Conflicts, 100% tolerance to all faiths and festivities, above par HDI scores
0503:Global Partnerships	0.15	Participation in Inter-Governmental Data Analytics for alignment on Strategic Priorities; Deliver on Sustainable Development Goals
0504: Foster Innovation	0.25	Green-Lean-Clean Development as the main driver for Innovation in the region and its Transfer for wider sustainable development
<b>Aspect 06: EVOLUTION</b>		$W_j$ Self = 0.14
0601:Empowerment	0.20	Decentralized planning and devolution of funds, community-based resources management, local governance institutions, legal reforms entitlements to the means of production, political and social organization and satisfaction of basic needs
0602:Ethics	0.20	Rich History of Indigenous Values & Ethics, Rick

		Folklores, Human- Nature Organic-Relationships, 'Global Responsibility-Local Accountability' based 'better tomorrow' actions for future citizens
0603:Security	0.20	Total assurance (Government to Business, Government to Citizen, Business to Business, Business to Customer) on Cyber Security, Physical Security, Social Security, Territorial Security, Environment Security, etc.
0604:Transfer	0.40	Inter-Governmental and Inter-Regional Best Practices (You <sup>S</sup> and S <sup>N</sup> ) transferred and Global-Local Partnerships in convergent action for the transformation of Geo-Cells to its developed status

Source: Author

## REFERENCES

- Ban Ki-moon (2014). People's Climate March, 21 September 2014. New York
- Brundtland Commission (1987). Our Common Future [Brundtland Report]. Oxford University Press.
- Bunge, Mario (2012). Evaluating Philosophies. Springer Dordrecht Heidelberg New York, London.
- Desforges, C. & Abouchaar, A. (2003) The impact of parental involvement, parental support and family education on pupil achievement and adjustment: A literature review. London: Department for Education and Skills.
- Goldman, Ian (2010). Local, Regional, and National Decentralised, Multistage Planning Processes, and Sustainable Development [National, Regional And Global Institutions, Infrastructures And Governance – Vol. I]
- Gorbachev, Mikhail (2006). [An Anthology Edited by Marco Keiner Swiss Federal Institute of Technology, ETH Zurich Springer, Dordrecht, The Netherlands, (2006)]. A New Glasnost for Global Sustainability, published in The Future of Sustainability, Springer, Dordrecht
- Kates, Robert W, et.al. Sustainability Science. International Institute for Applied Systems Analysis. Laxenburg, Austria. 2001

- Kaya, Yoichi; Yokoburi, Keiichi (1997). Environment, energy, and economy: strategies for sustainability. Tokyo. United Nations University Press.
- Meadows, Donella; Meadows L, Dennis et.al (1972). The Limits to Growth. [Commissioned by Club of Rome and funded by Volkswagen Foundation]. Universe Books
- Nordhaus D, William (1994). Managing the Global Commons. The Economics of Climate Change. MIT Press.
- Sachs D, Jeffrey (2015). The Age of Sustainable Development. New York. Columbia University Press.
- Stern, Nicholas (2009). A Blueprint for a Safer Planet - How to Manage Climate Change and Create a New Era of Progress and Prosperity. Random House.
- Stojanovic Ilija et.al (2016). Good Governance as a tool for Sustainable Development. European Journal of Sustainable Development. 5(4). 558-573. ISSN: 2239-5938
- Tonybee, Arnold J (1987). A Study of History [Abridgement of Volumes 1-6 by D.C Somervell]. Oxford University Press.
- UNDP Report (2017). Multi-Hazard Risk and Vulnerability Assessment (HRVA) for the city of Cuttack, Odisha. November 2017.

## **Resources**

- [www.hsph.harvard.edu/](http://www.hsph.harvard.edu/)
- [www.ipcc.ch/](http://www.ipcc.ch/)
- [www.stockholmresilience.org/](http://www.stockholmresilience.org/)
- [www.un.org](http://www.un.org)
- [www.unfccc.int/](http://www.unfccc.int/)
- [www.un.org/sustainabledevelopment/](http://www.un.org/sustainabledevelopment/)