Environmental Protection Guidelines and Its Developmental Impacts: A Study of SAARC Countries

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Abstract— The research is aimed at evaluating environmental protection policies and benefits of its implementation in the context of SAARC countries. It started with various international policy framework and guidelines to improve environment quality. All subsequent analysis has been performed on SAARC countries where the acceptance and ratification of global initiatives were pointed out. The impact of all the policy measures in the quantifiable output of key environmental indicators were assessed. Key indicators were identified from almost all environmental themes guided by UNEP. The outcome of the data has been analysed and continuous improvement has been observed. Some of the SAARC countries were extremely proactive in implementing the global frameworks whereas some took reasonable amount of time due to both internal and external constraints. The research also targeted to obtain the time frame required for legally bound policies to convert to measurable environment indicators with an emphasis on SAARC countries.

Keywords: Environmental Law, Environmental Indicators, Environmental Protection in SAARC Countries, Sustainable Achievement of SAARC Countries

I. INTRODUCTION

The need of environmental protection and implementation of related laws are of pivotal importance in contemporary world amidst high degree of modernization, industrialization and development. The initiatives were undertaken centuries ago where targeted areas were forests, water, marine and coastal land, agricultural land etc. Subsequently the focus got shifted to protect biodiversity rather than focusing only on pollution reduction. The global initiatives of framing various conventions and policies were ratified by governments and related laws were drafted. The SAARC countries accepted the global conventions (Figure 1) and committed to frame legal norms in similar lines. India had always been the trail-blazer among SAARC nations by participating in major international conventions ahead of others. While implementing legal framework, all the SAARC countries took utmost care in drafting legal framework. The Environment Protection Act (1997) was an all-encompassing environmental act in Nepal whereas Bangladesh implemented the Environmental Conservation Act (1995), The Wildlife (Conservation and Security) Act 2012, The Bangladesh Biodiversity Act 201. Pakistan Environmental Protection Act 1997 had covered most of the relevant areas and Environmental Protection and Preservation Act of the Maldives (1993) was one of the earliest to implement among SAARC nations. Sri Lanka implemented an all-inclusive National Environment Policy – 2003 whereas Afghanistan, being in continuous socio-politico doldrum, formed National Environmental Agency (NEPA) in 2005 passing Afghanistan's first Environmental Law in 2007. India, with the highest geographical area and the maximum biodiversity, had lead the SAARC nations by implementing multifarious policies with an aim to curb the pollution and environmental degradation menace. The Environment Protection Act, 1986, The Wildlife Protection Act, 1972, The Biological Diversity Act, 2002 are the landmark policy initiatives by India which were continuously monitored, and outcome was evaluated for further developments.

Effective from	1992	1975	1993	1983	1997	1987	2016	1975	2004	2004	1994	1996	1992	1972
Country	Basel Conv.	CITES	Conv. on Biological Diversity	Conv. on Migratory Species	Kyoto Protocol	Montreal Protocol	Paris Agreement	Ramsar Conv.	Rotterdam Conv.	Stockholm Conv.	UNCLOS	UNCCD	UNFCCC	World Heritage Conv.
Afghanistan	2013	1985	2002	2015	2013	2004	2017	...	2013	2013	...	1995	2002	1979
Bangladesh	1993	1981	1994	2005	2001	1990	2016	1992	...	2007	2001	1996	1994	1983
Bhutan	2002	2002	1995	...	2002	2004	2017	2012	...	...	...	2003	1995	2001
India	1992	1976	1994	1983	2002	1992	2016	1982	2005	2006	1995	1996	1993	1977
Maldives	1992	2012	1993	...	1998	1989	2016	...	2006	2006	2000	2002	1992	1986
Nepal	1996	1975	1994	...	2005	1994	2016	1988	2007	2007	1998	1996	1994	1978
Pakistan	1994	1976	1994	1987	2005	1992	2016	1976	2005	2008	1997	1997	1994	1976
Sri Lanka	1992	1979	1994	1990	2002	1989	2016	1990	2006	2005	1994	1998	1993	1980

Fig. 1:

II. PREVIOUS RESEARCH

The history of various research work pertaining to environmental policies and its impact is enriching. The report outcome of IUCN/UNEP/WWF: Gland, Switzerland, 1980 had strong bias for higher degree of carefulness and initiatives by countries for protecting environment. Howes, M., in 2005, Gómez-Baggethun, E.and Naredo, J.M, in 2015 and Baker, S.; Baumgartl, B, in 1998, had elaborated the need of government intervention and policy requirement to have a cleaner environment to live in.

Alshuwaikhat, H.M.; Rahman, S.M.; Aina, Y.A, in 2007, Pastakia, A., in 2002, Devkota, S.R, in 1999 had described the effectiveness of policy initiatives and legal framework related with environment in the context of Bangladesh, India and Nepal respectively. United Nations Millennium Ecosystem Assessment (UNMEA), 2005, Intergovernmental Panel on Climate Change (IPCC) report

2014, Asara, V.; Otero, I.; Demaria, F.; Corbera, E, in 2015 and Tisdell, C, in 2000 focused more on the human factors and the contribution of stakeholders to keep the environmental degradation under control. To them, the state policies take a backseat when the public response is concerned.

Pelletier, N, in 2010, Hysing, E, in 2013, Humphreys, D, in 1996 and Bogardi, J.J., Dudgeon, D., Lawford, R., Flinkerbusch, E., Meyn, A.; Pahl-Wostl, C., Vielhauer, K., Vörösmarty, C, in 2012 performed targeted study to analyze the requirement of policy interventions and lawmaking regarding multiple environmental aspects. They also emphasized the need of enforcement of these policies in the changing scenario across the globe. Their studies revolved around accountability of the citizens in the process and legally enforceable policies for securing globally defined goals.

Hindmarsh, R., in 2012 and Elder, M., in 2016, in their research work, had established the importance of planning and policy implementation in achieving environmental targets. They highlighted problem definition, quantified measuring criteria, analysis of data, preparation of policies and monitoring the progress are the steps that take a country to higher echelon in sustainable development. All the studies had a common goal-orientation i.e. achievement of targeted developmental indicators through reasonable and quantifiable policy interventions. These studies were eye openers to believe that dynamic monitoring of progress is a key to achieve goals and we took this idea forward to analyze the same on SAARC countries.

III. Initial Theoretical Framework and Methodology

The research work started with a definite aim to establish a measurable and quantifiable outcome pertaining to environmental improvement due to enforcement of various legally-bound policies. The analysis started with the evolution of various globally contemplated policies and framework in this regard. These had been ratified by member countries in due course, with or without much modification. Subsequently these global regulatory frameworks have been converted into laws in those countries to ensure faster and stricter implementation. Our work focused more on the effectiveness and results of the policy implementation which got reflected in the relevant indicators.

A. Environmental Indicators

While evaluating the impact of various policies on the overall environmental development, some key parameters have been identified to assess the changing impact. The key consideration area and relevant indicators have been depicted in Figure: 2.

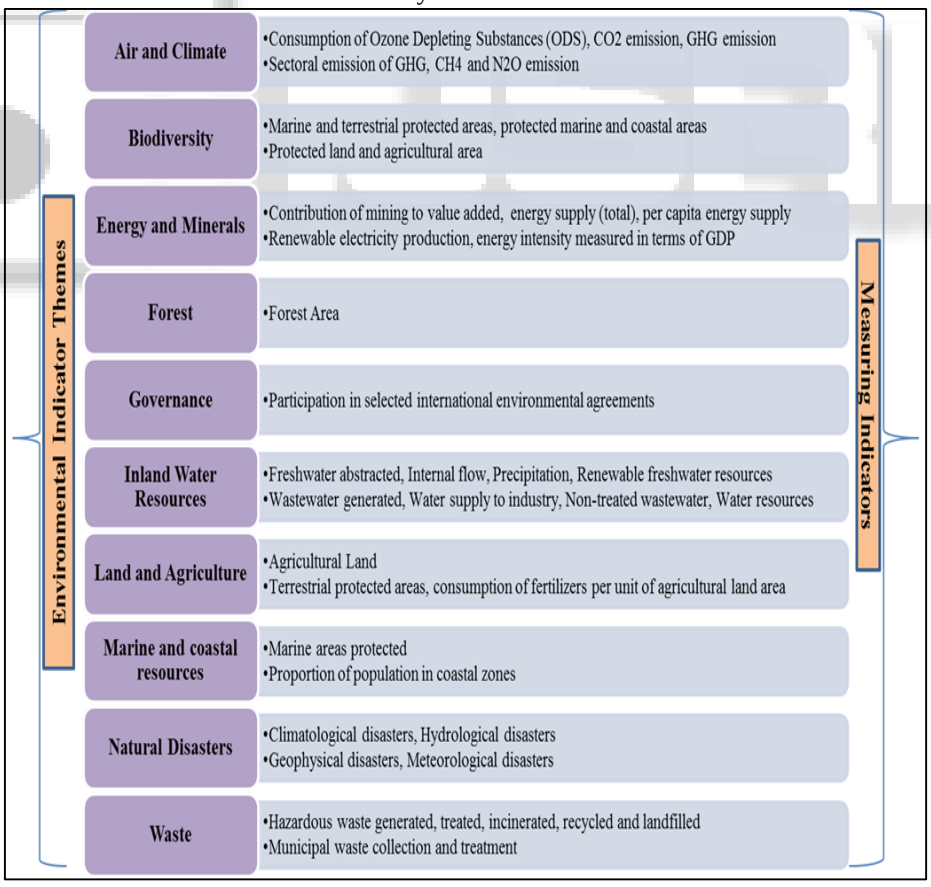

Fig. 2:

As all the indicator areas / themes are having multiple indicators involved in quantifying the parameters, we have decided to focus on some of the key ones which cater to the requirement of most of the broad domains. Hence we decided to perform detailed data analysis on Consumption of CFCs and Consumption of all ODS, CO2 emissions, Marine and Terrestrial protected areas, energy supply and renewable electricity production, per capita energy supply, contribution

of mining to value added, forest area, land and agricultural area, marine and coastal areas, natural disasters-Climatological, Hydrological, Geophysical, Meteorological of SAARC countries. The data analysis contains a target to ascertain the changes over a certain period of time to correlate it with the impact of various legally-bound policies implemented in relation with environmental improvement.

IV. Presentation of Data and Explanation

SAARC countries are very much significant in the context of environmental contribution due to its rich biodiversity, accelerating industrialization, industrial ambition and very high population density. As the tendency of environmental pollution had always been high, the requirement of effective policy implementation always prevailed to contain increasing degradation factors. Table: 1 shows the reduction in CFC and Ozone Depleting Substance (ODS) to a considerable extent mostly due to the effectiveness of various laws. Table 2 explicitly describes the increasing trend in marine and terrestrial protected areas where for all SAARC nations the proportion increased from 2000 to 2014. The increase is considerable for Bhutan and Nepal whereas it is significant for Pakistan, Sri Lanka and India due to higher coverage area. The proportion is insignificant in the case of Maldives and Afghanistan due to their landlocked nature. From Table 3, it is ascertained that per capita CO2 emission is quite significant for Maldives due to higher population density of the industrial nation and for India due to its greater prospect as an industrial nation. Table 4 reinforces the importance of ratification of various global initiatives that promote usage of renewable energy. Nepal, Bhutan and Afghanistan are examples for the rest of the world as they have almost 100% contribution of renewable energy in total energy production. The importance of green energy has been realized by other countries and the data is encouraging for them as well. Although the per capita energy supply is going upwards (Table 5) due to more production and increasing population, the higher contribution of renewable energy eases the expected higher load on nature. Table 6 signifies the reduction in contribution of mining in total value added for countries like India and Pakistan. The coverage of forest area is a concern for most of the SAARC countries. As India got a significant increase in forest area (Table 7) over the period of time,

Country	Consumption of CFCs			Consumption of all ODS		
	Baseline	2013	Reduction from baseline	2002	2013	Reduction from 2002
	ODP tonnes	ODP tonnes	%	ODP tonnes	ODP tonnes	%
Afghanistan	380.0	0	100.0	181.5	17.7	90.2
Bangladesh	581.6	0	100.0	350.1	64.9	81.5
Bhutan	0.2	0	100.0	0.1	0.3	-200.0
India	6 681.0	-19.8	100.3	15 026.9	956.1	93.6
Maldives	4.6	0	100.0	4.0	3.2	20.0
Nepal	27.0	0	100.0	2.6	0.7	73.1
Pakistan	1 679.4	0	100.0	2 347.2	247.0	89.5
Sri Lanka	445.6	0	100.0	227.4	13.4	94.1
Negative numbers will occur where exports plus destruction exceed actual production plus imports, e.g., if exports are from carry-over stock.						

Table 1:

Protected Areas: Marine & Terrestrial				
Country	Proportion 1990	Proportion 2000	Proportion 2014	Protected areas 2014
	%	%	%	km^2
Afghanistan	0.4	0.4	0.5	2 960
Bangladesh	0.6	3.2	3.4	7 452
Bhutan	14.2	35.1	47.3	18 888
India	2.7	3.0	3.1	167 688
Maldives	9.2	0.0	0.1	610
Nepal	7.7	18.6	22.9	33 865
Pakistan	8.0	8.0	8.6	87 805
Sri Lanka	2.3	2.4	2.6	15 870

Table 2:

Air and Climate quality: CO2 emission				
Country	CO_2 emissions	% change since 1990	CO_2 emissions per capita	CO_2 emissions per km^2
	mio. tonnes	%	tonnes	tonnes
Afghanistan	12.25	357.7	0.43	18.77
Bangladesh	57.07	267.4	0.37	386.73
Bhutan	0.56	337.3	0.77	14.61
India	2 074.34	200.4	1.66	631.02
Maldives	1.10	616.8	3.26	3 679.33
Nepal	4.33	583.2	0.16	29.45
Pakistan	163.45	138.4	0.94	205.32
Sri Lanka	15.23	293.7	0.75	232.17

Table 3:

Energy supply and renewable electricity production in 2015			
Country	Energy supply (peta joules)	Energy supply per capita	Contribution of renewable to electricity

		(gigajoules per capita)	production (%)
Afghanistan	145	4	86.07
Bangladesh	1 789	11	1.23
Bhutan	63	82	99.99
India	36 697	28	11.71
Maldives	19	52	1.28
Nepal	505	18	100.00
Pakistan	3 360	18	30.82
Sri Lanka	433	21	48.18

Table 4:

Sources: UNSD Energy Statistics Yearbook

Energy supply per capita (gigajoules per capita)						
Country	1990	1995	2000	2005	2010	2015
Afghanistan	4	1	1	1	5	4
Bangladesh	7	8	8	8	10	11
Bhutan	67	76	77	73	81	82
India	12	14	15	20	23	28
Maldives	11	14	24	30	40	52
Nepal	8	14	14	14	17	18
Pakistan	12	14	14	17	18	18
Sri Lanka	11	12	16	16	18	21

Table 5:

Sources: UNSD Energy Statistics Yearbook

countries like Nepal, Pakistan and Sri Lanka require more carefulness and extra initiatives in implementing the policies in this regard. It is understood that the agricultural land area has decreased in

Contribution of mining to value added (%)						
Country	1990	1995	2000	2005	2010	2015
Afghanistan	0.23	0.06	0.20	0.29	0.64	0.73
Bangladesh	0.74	1.05	1.01	1.14	1.66	1.65
Bhutan	0.98	2.38	1.63	1.58	2.32	2.64
India	3.29	2.80	2.85	3.34	3.43	2.60
Maldives	NA	NA	NA	NA	NA	NA
Nepal	0.39	0.47	0.43	0.49	0.53	0.61
Pakistan	2.88	2.17	2.44	3.23	3.34	2.75
Sri Lanka	2.97	2.43	2.21	2.08	2.17	2.52

Table 6:

Environmental Indicators: Forest area				
Country	Forest area in 1990 (Sq km)	Forest area in 2015 (sq km)	% change of Forest area since 1990	% of land area covered by Forest in 2015
Afghanistan	13 500	13 500	0.0	2.1
Bangladesh	14 940	14 290	-4.4	11.0
Bhutan	25 067	27 549	9.9	72.3
India	639 390	706 820	10.5	23.8
Maldives	10	10	0.0	3.3
Nepal	48 170	36 360	-24.5	25.4
Pakistan	25 270	14 720	-41.7	1.9
Sri Lanka	22 840	20 700	-9.4	33.0

Table 7:

case of most of the countries (Table 8) whereas the coastal countries have increased their marine and coastal area proportion significantly. Table 9 expresses a scenario that reflects the impact of multiple

Environmental Indicators: Land and Agriculture						
Country	Agricultural area in 2013	Change of agricultural area since 1990	Land area covered by agricultural area in 2013	Arable land in 2013	Permanent crops in 2013	Permanent meadows and pastures in 2013
	km^2	%	%	km^2	km^2	km^2
Afghanistan	379 100	-0.3	58.1	77 850	1 250	300 000
Bangladesh	91 080	-12.3	70.0	76 780	8 300	6 000
Bhutan	5 196	14.4	13.6	1 002	124	4 070
India	1 802 800	-0.6	60.6	1 570 000	130 000	102 800
Maldives	79	-1.3	26.3	39	30	10
Nepal	41 210	-0.6	28.7	21 140	2 124	17 950
Pakistan	362 800	3.1	47.1	377	308	14 000
Sri Lanka	27 400	17.1	43.7	125 700	49 690	94 030

Environmental Indicators: Marine and Coastal Areas			
Proportion 1990	Proportion 2000	Proportion 2014	Marine areas protected 2014
%	%	%	km^2
0.0	0.0	0.0	0
0.1	2.1	2.5	1 000
0.0	0.0	0.0	0
1.5	1.7	2.1	4 049
0.0	0.2	0.4	608
0.0	0.0	0.0	0
1.8	2.0	5.6	1 768
0.1	1.1	1.3	416

Table 8:

environmental forces and their gross negative outcome for a nation. It is evident that total number of natural disasters has not significantly reduced in 2007-16 compared to 1997-2006 but total deaths have been reduced to a great extent. Although the number of affected persons is reasonably high, but the decreasing trend in most of the SAARC countries express a ray of hope for days to come.

Natural Disasters: Climatological, Hydrological, Geophysical, Meteorological									
Country	Occurrence			Total deaths			Persons affected		
	1987-1996	1997-2006	2007-2016	1987-1996	1997-2006	2007-2016	1987-1996	1997-2006	2007-2016
Afghanistan	21	63	55	3 091	10 141	3 785	433 709	5 436 048	2 710 032
Bangladesh	72	87	51	150 951	5 674	7 090	151 871 232	64 648 578	48 203 965
Bhutan	2	3	3	39	200	24	65 600	1 000	20 028
India	96	147	154	33 018	74 323	21 651	574 374 356	654 157 494	457 854 919
Nepal	21	19	35	3 496	2 050	10 914	1 374 861	1 596 091	7 521 835
Pakistan	30	59	58	5 039	77 551	8 071	18 446 553	19 223 095	39 344 866
Sri Lanka	16	15	33	476	35 702	934	6 088 381	5 411 953	10 344 193

Table 9:

The data analysis covers a wide range of environmental themes explained earlier with key parameters / indicators to reflect the status of policy change.

A. Source of Data

The above analysis was performed with the data available at various relevant forums namely United Nations Statistical Division, UNEP, FAO etc. The SAARC countries have been chosen to perform the detailed analysis considering its developmental orientation and relevance in environmental aspects.

B. Scope and limitations of research

Further, it is imperative that detailed analysis of more indicators would have added more values to the paper. However, the parameters considered to gauge the improvement and policy impact had covered a wide range of themes. The available data mostly reflected the situation up to 2016 and the subsequent development was not incorporated in the process.

V. Conclusion

The research work establishes the very fact of international initiatives and its positive impacts on sustainability in case of SAARC countries. When we are careful and concerned about environmental degradation and contemplate on multiple out of the box initiatives like Green Building Code, Green City, Green Accounting etc, it is necessary to have basic indicators in place. The analysis pointed out improvement in most of the indicators for almost all SAARC countries. This reflects the urgency and effort of the policymakers. However, most of the SAARC countries accepted the international frameworks within a very short period and their continuous improvement entailed in improvised indicators. The Common but Differentiated Responsibility, which these countries yearn for, has not yet been accepted by developed countries in letter and spirit. This had not prevented these economically backward countries to stop caring for environment. SAARC countries have uniformly accentuated their global stance towards sustainable development although having definite need for more industrialization and manufacturing growth. The research concludes that the environmental indicators are gradually developing in a desired pace for SAARC countries and with timely guidance of various multilateral bodies, these countries will meet all relevant prescribed goals.

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