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Global Climate Financing of Multilateral Development Banks - An Analysis

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Abstract
The human Community in earth understood theemergency need to integrate forces to avert dangerous climate change. This requires mobilising financial resources from a wide range of sources, public and private, bilateral and multilateral, including alternative sources. This makes it increasingly important to track and report financial flows that support climate change mitigation and adaptation to create trust and accountability with regard to climate related investment. Climate Financing by Multilateral Development Banks (MDBs) comprising the African Development Bank (AFDB) the Asian Development Bank (ADB) the European Bank for Reconstruction and Development (EBRD) the European investment Bank (EIB) the inter-American Development Bank Group (IDBG) the world Bank (WB) and the International Finance Corporation (IFC). The vision of Paris agreement's in financial flows consistent with low greenhouse gas emissions and climate-resilient development plays a significant role in the MDBs work to improve tracking and reporting. At COP 24 in December 2018 the MDBs reinforced their commitment to combating climate change presenting joint approach that will align their activities with the goals of the internationalagreement. Based on the increasing role of MDB Banks in Climate Financing to different regions and sectors this paper focuses on the objectives such as To study climate Financing of Multilateral Banks and its role in minimising global CO2 emissions, To find the share of Adaptation Financeto total climate finance and also to determine the share of different banks in total adaptation funding. Based on the share, the moving pattern of financing by each group of banks would be analysed, to study the share of adaptation finance to total investments of funds in different sectors. The moving pattern of financing in different regions and sectors would also be observed. In order to study the variations in total amount allotted, amount for adaptation and amount on mitigation, Bank wise, Region wise and sector wise would be analysed. Data are collected from secondary sources for the years 2011 to 2018 from the reports of Multilateral Development joint report on climate finance. Regression was used to study the variation in variables such as total climate finance given by MDBs, Finance to Adaptation and Mitigation, Region wise financial distribution and sector wise allocation. The result of the study found that MDB banks are more innovative enough to distribute climate finance to various regions and to various sectors by pooling finance from various sources. Finance is given to countries to implement Adaptation and Mitigation measures separately. Comparatively finance to Adaptation is less to Mitigation. To utilize the Climate Finance more effectively MDB banks have to follow the approach of synthesizing both Adaptation finance and Mitigation Finance.
Keywords: Climate Finance, Adaptation, Mitigation, Co2 emissions, Stability Analysis

Introduction

Climate change is a phenomenon to which every human need to be respond. Present scenario in environmental crisis is positively connected to increasing demand on the natural resources by a growing global consumer class and industrialisation. 'Whilst the impacts of climate change are being felt globally, they fall disproportional on the poorest countries with fewer resources available to deal with the effects, developing countries are particularly vulnerable to adverse changes to their climate' (Stephen Sparatt-2011).

A consensus has been reached for the need to keep temperature increases below 2oc in practice if we are to have a 93% chance of achieving this, we must stabilise atmosphere greenhouse gas (GHG) concentration between 350PPM carbon dioxide equivalent (CO2e).The four-year period from 2015-2018has been confirmed as the hottest record reflecting exceptional warming, both on land and in the ocean a clear sign of continuing long term climate change associated with record atmospheres concentration of Green House Gases (Alan Miller and Stary Swann, 2019).

The Paris agreement reiterates the requirement for developed countries to produce Climate finance to developing countries for mitigation and adaptation whereas developing countries might voluntarily contribute to funding efforts. It pushed the annual goal of US$ 100 billion forward, to be sustained from 2020 to 2025 prior to which a new target will be agreed (AuMizanKhan.S , 2019). Identifying the financial implications of Climate risks would create enormous opportunities for profitable investment by all types of investors including both public and private funding. The UNFCCC Secretariat made a report on Investment and money Flows to handle global climate change in 2007. Addressing climate change would require significant shifts and an overall net increase in global investment and financial flows. The UNFCCC Report (2007) and other studies conclude that developing countries especially the poorest and those most vulnerable to the adverse impacts of climate change would need international financial support for mitigation and adaptation (Dennis Tirpat, 2009).

An integration is needed to avert dangerous of climate change was well understood by the international community. This requires mobilizing financial resources from a wide range of social public, private, bilateral and multilateral including alternative sources. That makes it increasing important to make and report financial flows that support climate change mitigation and adaptation to build must and accountability with regard to Climate finance commitments and monitor trends and progress in Climate related spending. (MDB, 2012 report).

International negotiations have distinguished 2 choices for addressing global climate change. Mitigation, reducing the sources or enhancing the sinks of greenhouse gases and Adaptation, responding to the results of global climate change policies and negotiations have treated them on an individual basis as a result of these 2 choices pursue totally different completely different} objectives and operate at different spatial and temporal scales. Mitigation provides benefits to the global climate in the long term because of the inertia of the climate system and adaptation provides more local benefits which can accrue in the short run at well as long term. As a result of this separation in international and national polices there is also a division between adaptation and mitigation in the financial resources mobilised by the international community to help developing countries cope with climate change. Mitigation activities can influence adaption positively or negatively and vice versa. Promoting activities that contribute to both climate objectives can increase the efficiency of fund and allocation and reduce trade-offs (Abadie et al, 2013).

The estimated cost a adapting to the impacts of climate change in developing countries is significant that is at least US$100 billion per year by 2030,US$ 70-100 billion per year in the period 2010-50, or between US$ 140 and 500 billion annually.Meanwhile developed countries pledged in mobilising US$100 billion p.a. by 2020 in funding for developing countries balanced between mitigation and adaptation. Developed countries have a duty to givetheir hands for adaptation and mitigation measures of developing countries as per UNFCCC.Based on the need to keep atmospheric concentrations within the 450-550 ppm CO2e range, to keep the temperature rise below 20C (Stern, 2006) the Intergovernmental Panel on Climate Change estimates that annual mitigation costs could be equal between 0.2% to three point five percent of global GDP or seventy eight billion dollars to thousand one

hundred and forty one billion dollars (IPCC, 2007). In 2007, the UNFCCC secretariat prepared a report on Investment and Financial Flows to address climate change (UNFCCC, 2007). Addressing climate change will require significant styles and an overall net increase in global investment and financial flows. Having recognised the various dimension climate finance different research studies were undertaken and few reports were prepared.Few are below.

Review of earlier studies on Climate Finance

The background paper by Dennis Tirpak, (2009) explains financing issues relating to mitigation and adaptation. It briefly reviews current funding mechanism, proposals for additional sources of funds and proposals relating to what should be funded and mechanisms, to structure a new financial agreement. This paper observed that the greater part of MDB lending is for infrastructure project. Only a small portion of lending relevant to adaptation is used directly adaptation projects most of when has so for focused on analytical work, capacity building and impact assessment.

Stephen Spratt of the Institute of Development Studies report on Climate Finance (2011) suggested a two stage assessment process namelyfirst order criteria such as sufficiency predictability, equity, additionally and verifiability and the second order criteria are efficiency, ease of implementation and co-benefit.

Bruno Locatelli et al, (2015a) in their paper focuses on integrating climate change mitigation and adaptation in agriculture and forestry. To the authors, the best possible combination of adaptation and mitigation strategies comes from optimisation analysis. Synergies are an alternative idea, based on the assumption that adaptation and mitigation actions may collide and the result of their combined effect is greater than the sum of their effects if implemented in separate manner. This paper concludes that to ensure climate policy integration, and need to move from the traditional end-of-pipe approach to a preventive approach that considers both adaptation and mitigation from the stage of policy formation.

Bruno et al, (2015) had analysed the synergies between adaptation and mitigation in climate change finance. Data collected through semi structured interviews with representation of climate funding organisation. Arguments used by respondents are in favour of adaptation and mitigation integration benefits and opportunities and against interaction (risks) at different scales (local to global) as well as argument on the barriers to this interaction. Authors opined that climatefunds may play in facilitating policy interaction and removing internal contradictions among climate change policies.

Valerie Michale et al (2018) in their report on climate policy initiative, understanding and increasing finance for Climate Adaptation in Developing Countries explores the current stand of finance for climate adaptation and proposes practical near term solutions to both fill in knowledge gaps and to increase investment. This report observes that current investments in adaptation constitute only a fraction of what is needed to avoid costly and catastrophic future impacts. Report has brought out that there is still little argument on what qualifies as adaptation finance and how it should be measured Multilateral Development Banks have developed and agreed upon tracking methodologies resulting in the most comprehensive data sets available. However these methodologies have not been widely adapted. The barriers that are prevailing the adaptation of adaptation practices are business model barriers and internal capacity barriers.

Alan Miller and Stacy Swann (2019) argues that it is time to fully align financial markets with the 2015 Paris argument and to recognize that this applies as much to the financial sector inclusive of financial institution and policy makers and it does to the real sector and population. Authors enlighten the existing barriers and challenges preventing the full integration of Climate Change Risks and opportunities within the financial system with large including for its institution.

Au Mizan Khan.S, (2019) in their paper on," Twenty five years of Adaptation finance through a Climate Justice, stated that through the Paris agreement 2015 stipulates a global goal on adaptation recognizing the international dimension of adaptation the pronouncements renamed vague but one positive aspect of the agreement is that it links adaptation needs with the level of mitigation and urges parties to make finance flows consistent with low carbon climate resilient development.

Climate Financing by Multilateral Development Banks

Climate Financing by Multilateral Development Banks (MDBs) comprising the African Development Bank (AFDB) the Asian Development Bank (ADB) the European Bank for Reconstruction and Development (EBRD) the European investment Bank (EIB) the inter-American Development Bank Group (IDBG) the world Bank (WB) and the International Finance Corporation (IFC). The international Community recognises the need to join forces to avert dangerous climate change. This requires mobilising financial resources from a wide range of sources, public and private, bilateral and multilateral, including alternative sources. This makes it increasingly important to track and report financial flows that support climate change mitigation and adaptation to build trust and accountability with regard to climate finance, commitments and monitor trends and progress in climate related investment MDBs activities by the MDBs are carried out in developing and emerging economies and is built on the premise that climate finance and development are closely aligned. (Joint climate finance report @ ebrd.com). The MDBs work to improve tracking and reporting is the output of Paris agreement's vision. At COP 24 in December 2018 the MDBs reinforced their commitment to combating climate change presenting joint approach that will align their activities with the goals of the Paris agreement. It is based on the following six building blocks that align with the objectives of the Paris agreement (1) mitigation goals (2) adaptation and climate resilience operations (3) accelerated transition to a global green economy through climate finance (4) engagement and support for policy development (5) reporting (6) alignment of internal activities.

Based on the increasing role of MDB Banks in Climate Financing to different regions and sectors this paper focuses on following objectives

1. To study climate Financing of Multilateral Banks and its role in minimising global CO2 emissions.
2. To find the share of Adaptation Finance to total climate finance and also to determine the share of different banks in total adaptation finance. Based on the share, the moving pattern of financing by each group of banks would be analysed.
3. To study the share of adaptation finance to total finance in different sectors. The moving pattern of financing in different regions and sectors would also be observed and
4. To study the variations in total amount allotted, amount for adaptation and amount onmitigation, Bankwise, Region wise and sector wise would be analysed.

Methodology

Data are collected from secondary sources for the years 2011 to 2018 from the Reports of Multilateral Development Joint Report on Climate Finance. Regression analysis is used to study the variation in variables such as total climate finance given by MDBs, Finance to Adaptation and Mitigation, Region wise financial distribution and sector wise allocation. Based on the results of regression, to test the stability in movement of the variables time variable t - analysis is made with the model.t value : $yt = \alpha + \beta t + ut$. t value for the β coefficient is reported to identify the stability of trend in y. The significance is reported at 5 % level.

Results and Discussions

Table 1 explains total Finance by MDB Banks .Among the different Banks ' annual average contribution for the years 2011 to 2018, World Bank's contribution is 25% and the least contribution is 8.41 %by ADB.

Table 1: Total Finance by MDB Banks in Million $

	2011	2012	2013	2014	2015	2016	2017	2018	Annual Average
AFDB	1639	2220	1205	2856	2917	4437	5234	4011	3064.88
ADB	3177	3284	3252	1916	1359	1061	2347	3272	2458.5
EBRD	3729	3131	3429	4112	3217	3494	4602	3826	3692.5
EIB	2777	3663	5224	5213	5137	4266	5477	5700	4682.13

IDBG	3851	3458	3848	5019	1744	2689	4348	4966	3740.38
WB	8984	11068	6757	9228	10722	11494	13216	21326	11599.4
TOTAL	24157	26824	23715	28344	25096	27441	35224	43101	29237.8

Source: Climate Finance, Joint Report on Multilateral Development Banks, Various Issues,www.ebrd.com

Table 2 explains Co2 emissions from different regions. The growth rate of CO2 emissions in Asian countries are increasing rapidly to the tune of 3.2 in the Middle East Countries and next increase in Asia Pacific region with growth rate 2.6.

Table 2: Details of Global CO2 Emissions by Geopolitical Regions during 2008 - 18 (in Milliontons)

Regions/ Year	Total North America	Total South and Central America	Total European	Total Common Wealth of Independence States	Total Middle East	Total Africa	Total Asia Pacific	Total world
2008	6652.9	1144.4	4939	1933	1620	1027.8	12959.2	30276.3
2009	6799.2	1106.3	4589.6	1875.6	1656.5	1041.6	13256.2	30325
2010	6434.7	1181.9	4700.6	1939	1736.2	1071.6	13994	31058
2011	6360.1	1235.8	4019	2035.1	1789	1073.1	14867.2	31379.3
2012	6134	1280.7	4562	2063.1	1926.3	1130.7	15317.4	32414.2
2013	6274.9	1330.6	4552.3	2014.6	1926.3	1130.7	15670.5	32899.9
2014	6310.9	1355.2	4720.3	2027.5	1965.2	1166.2	15799.5	33344.8
2015	6161.2	1317.3	42430	1966.5	2019.5	1173.7	15886	70954.2
2016	6058.2	1320.4	4286.9	1997.3	2061.5	1191.2	15998.9	32914.4
2017	6040.7	1306.6	4317.5	2001.2	2076.7	1206.1	16292.7	33241.5
2018	6157.9	1286.5	4248.4	2100.4	2118.8	1234.6	167.44	17314
GDP Growth	-1.2	1.7	-1.5	0.2	3.2	2.3	2.6	1

Source: BP Statistical Review World Energy

To find out the effectiveness of climate finance in reducing the co2 emissions correlation analysis made between total climate financing by Multilateral banks (Table1) and Global CO2 emissions (Table 2) and the results are given below

Table 3: Bivariate Correlation Matrix showing the relationship among CO2 emission anddifferent climate finance components viz., Total Climate Finance, Funds to Climate Change Adaptation and Funds to Mitigation of Climate Change effects during 2008-18

		1	2	3	4
1	CO2 Emission	1			
2	Total Funds Spent	-.509	1		
3	Funds to Adaptation	-.518	.952**	1	
4	Funds to Mitigation	-.475	.979**	.869**	1

**. Correlation is significant at the 0.05 level (2-tailed).

Table 3presents the Pearson's coefficient of correlation among the environmental variable such as CO2 Emission, total funds given, funds provided to adaptationactivities and funds provided to mitigation activities. Out of four variables three variables viz total funds given, funds mitigation and funds to adaptation were highly significant at 5 per cent level.

(a) Correlation between CO2 emission and spending on bank sponsored programmes to counter adverse effectsof climate change effects total, on adaptation and on mitigation.

The result showed that zero order pairwise correlation between CO2 emission and total funds spend, adaptation and mitigation were moderately negative though not significant. It found that CO2

emission was inversely related with all funding variables, which means that funds to adaption, funds to mitigation and total fundsgiven reduce the CO2 emission and the correlation between the variables were -0.509, -0.518 and -0.475 respectively.The sample size (n =8) is too small to make any inference about the relationship between the spending and the CO2 emission. However, the effect size is consistent across all the spending variables. Therefore, it may not be farfetched to infer that the CO2 emission comes down with the climate spending of banks but give the expected direction.

(b) Correlation between total funds spend and funds to adaptation

The result showed that the correlation between total funds given and funds to adaptation were positive revealed that the coefficient of correlation between total funds given and funds to adaptation was0.952 which means that an increase in total funds spent is likely to bestrongly positively associated withan increase infunds to adaptation which is good signatory in controlling the climate change related funding decision.

(c) Correlation between total funds spends and funds to mitigation

The result showed that the correlation between total funds given and funds to mitigation was highly positive significant at 1 per cent ($r(8) = 0.979$, $p<.01$). It revealed that coefficient of correlation between total funds givenand funds to adaptation was 0.979 which means that an increase in total funds spent is likely to be strongly positively associated with an increase in funds to mitigation which is an expected symptom on funding decision of climate crisis.

(d) Correlation between funds to adaptation and funds to mitigation

The result showed that the correlation between funds to adaptation and funds to mitigation were highly positive moving in same direction /significant at 1 per cent level ($r(8) = 0.87$, $p<0.01$). It revealed that the coefficient of correlation between Funds to adaptation and funds to mitigation was0.869 which means that an increase of Funds to adaptation was more likely to be strongly correlated with an increase in funds to mitigation, the direction of both variables gives a note about the funding on climate change which may help planners to invest in protecting the climate.

Trend analysis of Variables

Table 4: Details of Climate Finance by select Multilateral Development Banks during 2011-to-2018 (in Million US $)

S.No.	Banks	Type	2011	2012	2013	2014	2015	2016	2017	2018	Avr.	Continuity
1	AFDB	T	1639	2220	1205	2856	2917	4437	5234	4011	3065	2.83*
		A	595	512	437	719	356	1187	998	1286	761	3.52*
		M	1044	1708	768	2137	2561	3250	4236	2725	2304	4.16*
2	ADB	T	3177	3284	3252	1916	1359	1061	2347	3272	2459	0.62
		A	757	896	980	756	396	388	783	1601	820	-1.93
		M	2420	2388	2272	1160	963	673	1564	1671	1639	-0.92
3	EBRD	T	3729	3131	3429	4112	3217	3494	4602	3826	3693	3.21
		A	197	219	187	230	244	225	497	452	281	0.72
		M	3532	2912	3242	3882	2973	3269	4105	3374	3411	1.19
4	EIB	T	2777	3663	5224	5213	5137	4266	5477	5700	4682	1.02
		A	290	179	166	130	365	290	150	432	250	2.52*
		M	2487	3484	5058	5083	4772	3976	5327	5268	4432	2.86*
5	IDBG	T	3851	3458	3848	5019	1744	2689	4348	4966	3740	3.67*
		A	292	148	129	127	270	580	840	1274	458	0.44
		M	3559	3310	3719	4892	1474	2109	3508	3692	3283	0.36

6	WB	T	8984	11068	6757	9228	10722	11494	13216	21326	11599	2.44
		A	2389	4002	2927	3106	3393	3555	4087	7891	3919	2.79*
		M	6595	7066	3830	6122	7329	7939	9129	13435	7681	2.79*
7	TOTAL	T	24157	26824	23715	28344	25096	27441	35224	43101	29238	2.69*
		A	4520	5956	4826	5068	5024	6225	7355	12936	6489	3.21
			19637	20868	18889	23276	20072	21216	27869	30165	22749	3.24*

Source: Climate Finance, Joint Report on Multilateral Development Banks, Various Issues, www.ebrd.com
Note: A – Adaptation; M – Mitigation; T = Total; Avr. - Annual Average; Mncty – Monotonicity; * - significant t values at 5% level of significance [t(5) = 2.57].

In table 4, World Bank (WB) was observed to be the biggest and consistent contributor to the overall climate finance. European Investment bank (EIB) was observed to be the second largest contributor. They contributed more to the adaptation than mitigation. However, their funding for mitigation was found more consistent compared to adaptation. The Inter-American Development Bank Group(IDBG) was observed to be the third largest contributor to the overall climate finance. The mitigation finance was found increasing steeply. European Bank for Reconstruction and Development (EBRD) was found to be contributing largely to adaptation finance and become the third largest contributor. African Development Bank (AfDB)was found to increase its overall climate finance steadily along with adaptation and mitigation finance. Mitigation finance was found to be impressive and increasing. The overall climate finance of Asian Development Bank (ADB)was found to be less impressive. But in terms of mitigation finance, ADB stands next to WB.

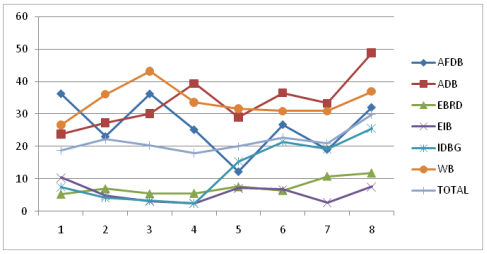
From the last column of table 4, in EIB bank & WB bank there is stability in total amount spent and total amount spent on mitigation. No stability in amount given to adaptation. Likewise, in IDBH bank there is stability in amount given to adaptation and no stability in total amount given and mitigation. Hence in overall, it is revealed from the table that except AFDB bank, there is some zig zag movement or no stability in funds given pattern on climate change with respect to bank wise. Overall climate spending of WB, EIB and AFDB was uniformly increasing during the study period. Lending for adaptation was sustainably increasing for WB and EIB. IDBG was found to lend consistently for mitigation only. Table 5 explains proportion of Adaptation Finance in climate finance by MDB Banks.From table it is inferred that the World Bank's contribution was 60% and EIB contributed the least 7.05 %.

Table 5: Percentage of Adaptation to Total Finance select Multilateral Development Banks during 2011--2018

Adaptation	2011	2012	2013	2014	2015	2016	2017	2018
AFDB	36.3	23.06	36.27	25.18	12.2	26.75	19.07	32.06
ADB	23.83	27.28	30.14	39.46	29.14	36.57	33.36	48.93
EBRD	5.28	6.99	5.45	5.59	7.58	6.44	10.8	11.81
EIB	10.44	4.89	3.18	2.49	7.11	6.8	2.74	7.58
IDBG	7.58	4.28	3.35	2.53	15.48	21.57	19.32	25.65
WB	26.59	36.16	43.32	33.66	31.65	30.93	30.92	37
TOTAL	18.71	22.2	20.35	17.88	20.02	22.69	20.88	30.01

Source: Calculated by the Author

Table 5 and Graph 1explains the percentage of Adaptation Finance to total Finance among the Banks under Multilateral Banks Climate Finance. While the total Adaptation Finance is moving at steady manner, the Banks moving at an upper limit are AFDB, IDBG and WB. The lower limits are by EBRD, EIB and AFDB.



Graph 1: The percentage of Adaptation Finance to total Financeby Banks

Adaptation finance in proportion was slightly increasing (18.71 to 30.1). The proportion was high for ADB (48.93) and WB (43.32) in 2018, and low for EIB (2.49), EBRD (3.28) and IDBG (2.53) in 2014. Also, the proportion of Adaptation finance was found to be increasing significantly for IDGB (25.65) in 2018. This proportion was markedly fluctuation for AFDB.

Table 6: Details of Climate Finance by Geopolitical Regions during 2011-to-2018 (in Million US $)

Region	Type	2012	2013	2014	2015	2016	2017	2018	Avr.	Mncty
South Asia	A	1266	1008	1687	1484	1442	1070	3107	1581	1.61
	M	2460	2113	4282	3193	4114	3777	3851	3399	2.05
	T	3726	3121	5969	4677	5556	4847	6958	4979	2.52
East Asia and Pacific	A	1098	1072	678	494	1791	1370	1695	1171	1.5
	M	3227	3236	2168	2966	3499	3731	3368	3171	1.04
	T	4325	4308	2846	3460	5290	5101	5063	4342	1.39
Sub Saharan Africa	A	1836	952	1351	934	592	2038	3893	1657	1.38
	M	1814	2105	2928	1272	1297	3674	6064	2736	1.89
	T	3650	3057	4279	2206	1889	5712	9957	4393	1.71
Middle East and North Africa	A	197	85	167	498	536	507	1990	569	2.77*
	M	1831	472	2299	1691	2035	3014	3489	2119	2.75*
	T	2028	557	2466	2189	2571	3521	5479	2687	3.39*
Latin America and Caribbean	A	1118	473	454	1052	1091	1724	822	962	0.97
	M	3813	2332	4228	2686	3171	5451	6780	4066	2.1
	T	4931	2805	4682	3738	4262	7175	7602	5028	2.3
Other Europe and Central Asia	A	273	301	625	314	462	616	849	491	2.86*
	M	3854	4807	3880	4718	4423	4132	4280	4299	0.22
	T	4127	5108	4505	5032	4885	4748	5129	4791	1.52
European Union	A	132	106	97	160	286	15	564	194	1.48
	M	2862	3244	3300	3057	2572	3600	2798	3062	-0.1
	T	2994	3350	3397	3217	2858	3615	3362	3256	0.78
Regional	A	36	829	10	88	24	11	17	145	-1.06
	M	1007	620	191	489	105	489	534	491	-1.16
	T	1043	1449	201	577	129	500	551	636	-1.55
Total	A	5956	4826	5069	5024	6224	7351	12937	6770	2.41
	M	20868	18929	23276	20072	21216	27868	31164	23342	2.96*
	T	26824	23755	28345	25096	27440	35219	44101	30111	2.93*

Source: Climate Finance, Joint Report on Multilateral Development Banks, Various Issues,www.ebrd.com

Note: A – Adaptation; M – Mitigation; T = Total; Avr. - Annual Average;Mncty – Monotonicity and * - significant t values at 5% level of significance [t(6) = 2.45].

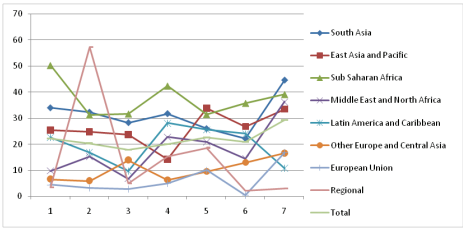
From table 6 it is inferred that Latin American countries region was observed to be largest climate finance receiving country. The found was that not less than 3/4th of the found was spent on the mitigation

programmes. The second largest region receiving climate finance was South Asia. The amount spent was mitigation programme was witnessing steep increase and reached up to 80% of the total climate finance. The region consisting of Central Asia and European Countries other than EU was the third highest. Mitigation finance programmes received major attention in those regions. In the later years, the amount spent on the adaptation programmes were increasing marginally. Sub Saharan African Region was also receiving a significant amount of climate finance. In this region mitigation finance was slightly higher than the adaptation finance. In East Asia and Pacific Region the climate finance was not showing significant uptrend. The major component of Climate Finance was the mitigation finance. The share of mitigation spending was close of 3/4th of Climate Finance. In the European Union and North African region the climate finance was comparatively low. In both the regions the mitigation component was close to 90% of the total Climate Finance.

Table 7: Percentage of Adaptation to Total Finance by Regions

Regions/Year	2012	2013	2014	2015	2016	2017	2018
South Asia	33.98	32.3	28.26	31.73	25.95	22.08	44.65
East Asia and Pacific	25.39	24.88	23.82	14.28	33.86	26.86	33.48
Sub Saharan Africa	50.3	31.14	31.57	42.34	31.34	35.68	39.1
Middle East and North Africa	9.71	15.26	6.77	22.75	20.85	14.4	36.32
Latin America and Caribbean	22.67	16.86	9.7	28.14	25.6	24.03	10.81
Other Europe and Central Asia	6.61	5.89	13.87	6.24	9.46	12.97	16.55
European Union	4.41	3.16	2.86	4.97	10.01	0.41	16.78
Regional	3.45	57.21	4.98	15.25	18.6	2.2	3.09
Total	**22.2**	**20.32**	**17.88**	**20.02**	**22.68**	**20.87**	**29.33**

Source: Calculated by the Author



Graph 2: Percentage of Adaptation to Total Finance By Regions

As per table 7, Graph 2 finds Sub Sahararian Africa is getting more Adaptation funds and next highest recipient is South Asia. Among the regions other Europe and central Asia is the lower one in receiving the Adaptation finance while the regional one shows a haphazard trend where only one time it got a higher finance among other regions is.

Table 8: Total Climate funds allotted by Sector in Million $

Sectors	2012	2013	2014	2015	2016	2017	2018	Annual Average
Water and Waste Water Systems	3937	5109	6555	5691	7188	9475	11507	7066
Agricultural and Ecological Systems	9510	5806	10046	7641	8099	10887	12857	9263.71
Industry Management and Trade	4749	4344	6554	5312	4727	8120	5436	5606
Infrastructure, Energy and Build Environment	3334	3184	2455	3024	2763	3583	5149	3356

Others	1847	719	708	1180	1148	2240	6135	1996.71
Total	23377	19162	26318	22848	23925	34305	41084	27288.42

Source: Climate Finance, Joint Report on Multilateral Development Banks,
Various issues,www.ebrd.com

Table 8 explains total climate funds allotted to different sectors. On taking the annual average spending for the years 2012 to 2018, funds allotted to gets higher share throughout the years 2012-2018. Apart from other sectors, Infrastructure, Energy and Build Environment gets lower share.

Table 9: Adaptation fund allotted by Sector in Million $

Sectors	2012	2013	2014	2015	2016	2017	2018	Annual Average
Water and Waste Water Systems	477	788	541	1362	1129	2600	2331	1318.286
Agricultural and Ecological Systems	1995	988	1817	1623	1905	1669	4204	2028.714
Industry Management and Trade	6	114	238	29	60	6	89	77.42857
Infrastructure, Energy in Builds Environment	2150	2469	1994	1819	2066	2026	2824	2192.571
Others	1328	470	479	670	730	1051	3795	1217.571
Total	5956	4829	5069	5503	5890	7352	13243	6834.571

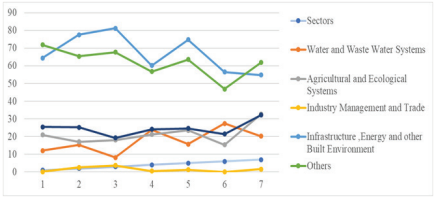
Source: Climate Finance, Joint Report on Multilateral Development Banks,
Variousissues,www.ebrd.com

Table 9 explains total climate funds allotted to different sectors. On taking the annual average spending for the years 2012 to 2018, funds allotted Infrastructure, Energy and Build Environment gets higher share throughout the years 2012-2018. Apart from Industry Management and Trade, Agricultural and Ecological Systems others also gets lower share. Infrastructure, Energy in Builds Environment gets higher share.

Table 10: Percentage of Adaptation to Total Finance by Sectors

Sectors	2012	2013	2014	2015	2016	2017	2018
Water and Waste Water Systems	12.12	15.42	8.25	23.93	15.71	27.44	20.26
Agricultural and Ecological Systems	20.98	17.02	18.09	21.24	23.52	15.33	32.7
Industry Management and Trade	0.13	2.62	3.63	0.55	1.27	0.07	1.64
Infrastructure ,Energy and other Built Environment	64.49	77.54	81.22	60.15	74.77	56.54	54.85
Others	71.9	65.37	67.66	56.78	63.59	46.92	61.86
Total	25.47	25.20	19.26	24.09	24.62	21.43	32.23

Source: Calculated by the Author



Graph 3: Percentage of Adaptation to Total Finance by Sectors

Table 10 and Graph 3 explains the adaptation funding trend pattern on different sectors .While taking the total funding, total contribution is increasing all the sectors. The Priority sector of Adaptation can be infrastructure, Energy in Build Environment and others. The Lower trend can be observed in sectors such as Water and waste water System, Agricultural and Ecological system and industry management and trade.

Stability Analysis

By using the t values of regression coefficient (β) the stability analysis is made.t –time coefficients values are calculated with the equation:yt = α + β t +utt value for the β coefficient is reported to identify the stability of trend in y. The significance is reported at 5 % level.

Table 11: t Coefficient- Results of Stability Climate Change to Banks Wise

Name of the banks	Total Amount Given	Total Amount given to adaptation	Total Amount given to mitigation
AFDB	4.16*	2.83*	3.52*
ADB	-0.92	0.62	-1.93
EBRD	1.19	3.21	0.72
EIB	2.86*	1.02	2.52*
IDBH	0.36	3.67*	0.44
WB	2.79*	2.44	2.79*
Total	3.24*	2.69*	3.21

*** 6 Degrees of Freedom -2.45**

It is observed from the Table 11 that there is stability in total amount given, total amount given to adaptation and total amount given to mitigation regarding AFDB bank. Because, in AFDB bank, according to the table, all observed values are greater than the critical (degrees of freedom) value. In EIB bank & WB bank there is stability in total amount spent and total amount spent on mitigation. No stability in amount given to adaptation. Likewise, in IDBH bank there is stability in amount given to adaptation and no stability in total amount given and mitigation. Hence in overall, it is revealed from the table that except AFDB bank, there is some zig zag movement or no stability in funds given pattern on climate change with respect to bank wise.

The table 12 explains Region wise Stability in spending on Climate Finance. It is revealed that there is stability in total amount given, total amount given to adaptation and total amount given to mitigation regarding Middle East region. Because, in Middle East region, according to the table, all observed values are greater than the critical (degrees of freedom) value. In Central America, there is stability in amount received on adaptation and no stability in total amount given to mitigation. Hence in overall, it is observed from the table that except Middle East region, there is some zig zag movement or no stability in financing pattern on climate change with respect to region wise. Though the global aggregate of climate finance was consistently increasing, except Middle East & North Africa and Non-EU European region, no region was showing up uniform increase in overall climate finance or in any sub component. Even in global aggregate, only mitigation finance was showing a consistent increase. In the Middle East & North African region, a low climate investment region, overall climate finance and its sub components showing a sustained increase in the study period. In Central Asia & Non EU European region only the adaptation finance was showing a sustained increase over the period.

Table 12: Results of Stability Climate finance Region Wise

Region	Total Funds given	Adaption Funds	Mitigation Funds
South Asia	2.52	1.61	2.05
East Asia	1.39	1.51	1.04
Sub Africa	1.71	1.38	1.89
Middle East	3.39*	2.77*	2.75*
Latin America	2.3	0.97	2.10
Central America	1.52	2.86*	0.22
European Union	0.78	1.48	-0.10
Regional	0.55	-1.06	-1.16
Total	2.93*	2.41	2.96*

***5 Degrees of Freedom -2.57**

Table 13 explains sector wise Stability in allocation on Climate Finance. Sectors included in each group are given in Table 14. It is observed from the Table 13 that there is stability in total allocation, regarding group I sector of Water and Water System. In I Group of Sectors, according to the table, in all other sectors, all observed values are smaller than the critical (degrees of freedom) value. Hence there is no stability except first sector in Group I.In Group II there is stability in total amount allocated, adoption and total amount given to mitigation with respect to energy efficiency sector. No stability in all other sectors in Group II. In Group III there is stability in

total amount allocated, adaptation and total amount given to mitigation with respect to infrastructural energy of build environments. No stability in all other sectors in Group III. Hence in overall, it is revealed from the table that except one sector in each Group, there is no stability in financing pattern on climate change with respect to sector wise.

Table 13: Time coefficient results to test the stability of financing sector wise

S.No	I Group Total Allocation	II Group Allocation for adaptation	III Group Allocation for Mitigation
1	6.34*	4.38*	1.26
2	1.71	1.74	1.17
3	1.14	0.31	1.91
4	1.59	0.63	2.70*
5	1.97	1.58	0.75
6	1.22	2.37	2.45
7		4.34*	

***5 Degrees of Freedom -2.57**

Table 14: Details of I Group of Sectors, II Group of Sectors and III Group of Sectors

I Group of Sectors	II Group of Sectors	III Group of Sectors
1. Water and Waste Water Management	1. Energy Efficiency	1. Water and Waste Water Management
2. Agricultural and Ecological System	2. Renewable Energy	2. Agricultural Ecological System
3. Industrial and Trade	3. Sustainable Transport	3. Industrial Management and Trade
4. Infrastructure, Energy and Built in Environment	4. Agricultural and Land use	4. Infrastructure,Energy and Built Environment
5. Others	5. Waste and Water Waste	5. Others
6. Total	6. Cross Sector and Other	6. Total
	7. Total	

Major Findings

The correlation between total funds given and funds to adaptation were total funds given and funds to mitigation, funds to adaptation and funds to mitigation were highly significant. The result showed that Correlation between CO2 emission and funds spend, adaptation and mitigation were negative but not significant. It revealed that CO2 emission was negatively associated with all variables which means that fund to adaption, funds to mitigation and total fund allotted to reduce the CO2 emission.

- While the total Adaptation Finance is moving at a steady manner, the Banks moving at a upper limit are AFDB, IDBG and WB. The lower limits are by EBRD, EIB and AFDB.
- Among the regions, Sub Sahararian Africa is getting more Adaptation funds and next highest recipient is South Asia. Among the regions other Europe and central Asia is the lower one in receiving the Adaptation finance while the regional one shows a haphazard trend where only one time it got a higher finance among other regions is.
- The Priority sector of Adaptation can be infrastructure, Energy and other Built in Environment .The Lower trend can be observed in sectors such as Water and waste water System, Agricultural and Ecological system and industry management and trade.
- Stability analysis revealed that EIB bank & WB bank there is stability in total amount received and total amounts for mitigation. No stability in amount given to adaptation. Likewise, in IDBH bank there is stability in amount given to adaptation and no stability in total amount given and mitigation. Hence in overall, it is revealed

that except AFDB bank, there is some zig zag movement or no stability in funds given pattern on climate change with respect to bank wise.

- Region wise Stability in spending on Climate Finance is revealed that there is stability in total amount given, total amount given to adaptation and total amount given to mitigation regarding Middle East region. In Central America, there is stability in amount received on adaptation and no stability in total amount given to mitigation. Hence in overall, it is observed that except Middle East region, there is some zig zag movement or no stability in financing pattern on climate change with respect to region wise.
- Regarding the sector wise Stability in allocation on Climate Finance it is observed that there is stability in total allocation, regarding sector of Water and Water System. There is stability in total amount allocated, adoption and total amount given to mitigation with respect to energy efficiency sector. There is stability in total amount allocated, adaptation and total amount given to mitigation with respect to infrastructural energy of build environments. Hence in overall, it is revealed from the table that except one sector in each Group, there is no stability in financing pattern on climate change.

Conclusion

To overcome the ill effects of climate change, investments in various projects which are having less carbon emissions intensity is the needed one. For this both developing as well as developed countries irrespective of their GHG potential need sources of climate Finance locally and globally. MDB banks are more innovative enough to distribute climate finance to various regions and to various sectors by pooling finance from various sources. Finance is given to countries to implement Adaptation and Mitigation measures separately. Comparatively finance to Adaptation is less to Mitigation. Toutilize the Climate Finance more effectively MDB banks have to follow the approach of synthesising both Adaptation finance and Mitigation Finance.

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