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Sustainable Development Goals and Environmental Sustainability: A Study from Uttarakhand, India

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ABSTRACT

The concept of Sustainable Development Goals (SDGs) came into existence in 2015 in place of Millennium Development Goals (MDGs) but the concept of SDGs is much broader than MDGs. The SDGs have 17 goals covering 169 targets which have to be achieved by 2030. These goals are much broader in their terms, extending from the socio-economic aspect to the natural environment. The specific aim of this paper is to study the progress of Uttarakhand State on SDGs and environmental sustainability. For this objective, the Uttarakhand SDG State Indicator Framework (SIF) and District Indicator Framework (DIF) report 2022 released by the Centre for Public Policy and Good Governance (CPPGG) is analyzed here. The analysis reveals that Uttarakhand has improved its overall SDG score by 13 points from 60 in 2018 to 73 in 2023. The composite score varies between 0 to 100 where 0 indicates the bottom in the table and 100 indicates the target achieved set for 2030. Based on the overall score the districts are categorized into four groups which are: aspirant (0-49), performer (50-64), front runner (65-99), and achiever (100). Uttarakhand is working very hard to achieve the SDGs targets by 2030. Six SDG Goals, i.e., goals 6, 7, 12, 13, 14, and 15 are directly or indirectly related to the natural environment but in the State, the monitoring and assessment work has started only for SDGs 6, 7, 12, and 15. The overall progress of the State on environmental sustainability is poor and all the goals related to the environment are needed special attention as some goals are out of assessment progress.

1. Introduction

The concept of Sustainable Development evolved from the Millennium Development Goals. Sustainable development has become a pivotal concept in the modern world, where the well-being of current and future generations is intertwined with the health of the planet. In 2015, the international community adopted the Sustainable Development Goals (SDGs), a set of 17 goals and 169 targets that have to be achieved by 2030, aimed at addressing various global challenges while promoting economic growth, social inclusion, and environmental sustainability (UN, 2015). These goals underscore the urgent need to balance human development with environmental preservation. The significance of the SDGs lies in their universality (Scharlemann et al., 2020). These goals are not limited to developing nations or specific regions but apply to all countries, acknowledging the shared responsibility for fostering sustainable development. Moreover, the SDGs provide a common framework for governments, businesses, civil society, and individuals to collectively work towards achieving a more equitable and sustainable world. As a result, they serve as a blueprint for addressing pressing global issues such as poverty, inequality, climate change, environmental degradation etc (Arora and Mishra, 2019; Elder and Olsem, 2019).

One of the core principles of sustainable development is the integration of environmental sustainability. The environment is the foundation of all human activities, providing essential resources like clean air, water, food, and energy. It also regulates climate and supports biodiversity. Therefore, achieving sustainable development necessitates a harmonious relationship between human activities and the environment. Environmental sustainability, as reflected in

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SDGs, involves a multifaceted approach to address various environmental challenges. These challenges include clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), responsible consumption and productivity (SDG 12), climate change (SDG 13), the conservation of life below water (SDG 14) and life on land (SDG 15). Importantly, these goals are interdependent. For instance, combating climate change requires responsible energy production and consumption, which in turn impacts ecosystems on land and in the ocean (Arora and Mishra, 2019; Sinha et al., 2020).

The goals provide a shared vision for the future, aligning the efforts of governments, organizations, and individuals in a common cause. In pursuing these objectives, the international community acknowledges that the challenges of our time are interconnected and require holistic solutions. To illustrate this interconnectedness, let's consider the relationship between poverty alleviation (SDG 1) and environmental sustainability. In many cases, the poorest communities are the most vulnerable to environmental degradation, as their livelihoods often depend directly on natural resources. Thus, addressing poverty and promoting environmental sustainability go hand in hand (Schleicher et al., 2018). Sustainable development has become a global imperative as the world faces unprecedented challenges related to environmental degradation. The SDGs emerged as a comprehensive framework for addressing these complex issues, emphasizing the interconnection between economic growth, social inclusion, and environmental protection. Achieving environmental sustainability is integral to the success of the SDGs, as it underpins many of the other goals, from ending poverty and hunger to ensuring access to clean water and sanitation (Salehabadi et al., 2020).

The latest SDGs index report from the Sustainable Development Solutions Network (SDSN) reveals that no country is on track to meet the SDG targets by 2030. The least progress has been observed, particularly in goals related to the environment (Sachs et al. 2019). There is no doubt that if the environmental issues are not addressed on priority these will negatively affect other achievements significantly. Therefore, the fundamental objective of the present study is to analyze the progress of the Himalaya state Uttarakhand on environment-related SDGs

2. Materials and methods

2.1 Study area

The study area, viz., the Uttarakhand state extends between 77°34' to 81°02' E longitudes and 28°43' to 31°27' N latitudes and encompasses an area 53483 km² which accounts for 1.63% of the total geographical area of the country (Fig. 1). Out of the total geographical area, about 86% (i.e., 46035 km²) area falls under hilly region and the remaining 14% (i.e., 7448 km²) area falls under plain region. Administratively, the Uttarakhand state is divided into two commissionaires, 13 districts, 95 developmental blocks, 110 tehsils, 670 nayay panchayats, 7791 gram panchayats and 16793 revenue villages (DESDP, 2020). The State is bordered by Tibet and China in the north, Uttar Pradesh in the south, Himachal Pradesh in the west and Nepal in the east.

The physiography of the study area is very diverse and ranges from the Tarai region (plains area) in the south to the Trans Himalaya region (mountainous area) in the north and there are several climatic zones that vary from tropical climate to alpine climate. This shows the physio-climatic diversity of the State which is sensitive for various environmental issues like climate change, global warming, aquatic and terrestrial life etc. Therefore, it is important to analyze the progress of the State on environmental sustainability.

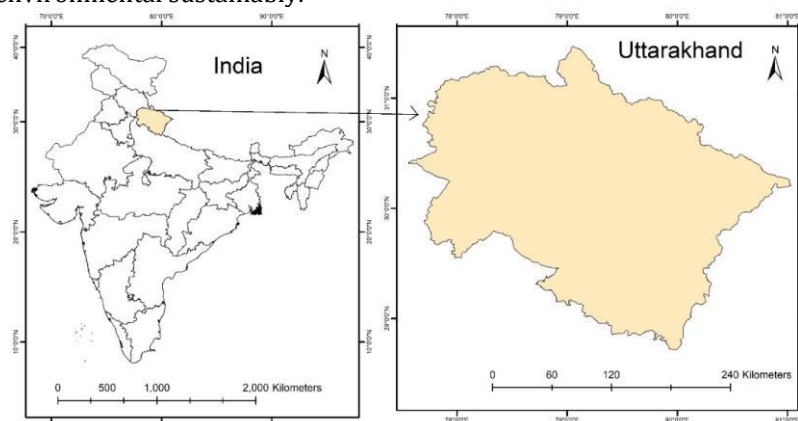


Fig.1: Location map of the study area, viz., the Uttarakhand State.

2.2 Methodology

The present study is mainly based on secondary data. To collect the data on different sustainable development goals (SDGs) and the overall score of the State, Uttarakhand SDG State Indicator Framework (SIF) and District Indicator Framework (DIF) report 2022 published by the Centre for Public Policy and Good Governance (CPPGG) is used here to analyze and interpret the progress of the State on environmental related SDGs. Despite this, various published government and non-government reports and related relevant literature have been reviewed here for a wider understanding. To prepare the thematic maps of the study area, Quantum Geographical System (QGIS) and ArcGIS software have been used at Natural Resource for Data Management System (NRDMS), SSJ University and Campus, Almora. Microsoft Word and Excel

Office have used to prepare this manuscript and analyze the data, respectively. The paint application has also been used to make the maps more meaningful.

3. Results and discussion

There are total 17 sustainable development goals (SDGs) and 169 targets which have to be achieved by 2030. The core principle of SDGs is their interrelationship and interdependency. The whole world is working towards the achievement of SDGs on or before 2030 but still, it is not seems possible. At present time, various environmental related problems have emerged that are affecting the livelihood of the entire world. In other words, the basic aim of the SDGs was to meet the targets in the coming 15 years in areas of critical social-economic and environmental issues.

Uttarakhand is a Himalayan state of India which is working hard to get the SDGs under due frame time. This study demonstrates that Uttarakhand has improved its overall SDG score by 13 points from 60 in 2018 to 73 in 2023. At present, eight years we have spent working on it and only seven years are rest now to achieve all the SDGs. This is noteworthy that about 90% area of the Uttarakhand state falls under the fragile Himalayan region which is highly sensitive for climate change and other environmental problems. Therefore, after the completion of execution of eight years of SDGs, it is important to analyze the progress of the State on environmental related SDGs. Environmental sustainability includes clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), responsible consumption and productivity (SDG 12), climate change (SDG 13), the conservation of life below water (SDG 14), and life on land (SDG 15). A brief description of the progress of Uttarakhand state on these SDGs is presented in the following paragraph.

Sustainable Development Goal-6: This goal focuses on ensuring access to clean water and sanitation for all. This goal recognizes the fundamental importance of water and sanitation in promoting well-being and preventing diseases. Clean water is not only essential for drinking but also for agriculture, industry, and ecosystems. Achieving this goal has a profound impact on several other SDGs, e.g., it is linked with SDG 3 (Good Health and Well-being) by reducing waterborne diseases, it supports SDG 2 (Zero Hunger) by enhancing water availability for agriculture, and it often reduces the burden on women and girls who are traditionally responsible for water collection.

Table-1: Details of district-wise score of environmental-related sustainable development goals in Uttarakhand State for two years. (Source: cppgg).

S.N	District	SDGs Score in 2015-16				SDGs Score in 2021-22			
		Goal 6	Goal 7	Goal 12	Goal 15	Goal 6	Goal 7	Goal 12	Goal 15
1	Almora	60	53	NA	100	56	49	55	100
2	Bageshwar	43	39	NA	100	65	40	86	100
3	Chamoli	55	47	NA	100	70	57	94	100
4	Champawat	50	49	NA	100	64	62	87	100
5	Dehradun	82	75	NA	100	92	47	65	100
6	Haridwar	46	59	NA	69	63	39	85	74
7	Nainital	50	75	NA	100	59	61	95	100
8	Pauri	63	58	NA	100	52	60	88	100
9	Pithoragarh	34	17	NA	87	56	72	77	89
10	Rudraprayag	53	69	NA	100	60	62	86	100
11	Tehri	63	33	NA	100	41	62	89	100
12	U.S. Nagar	9	75	NA	50	46	36	75	50
13	Uttarkashi	48	69	NA	100	60	45	98	100
	Uttarakhand	51	59	NA	100	63	50	78	100

The present study shows that Uttarakhand has improved the score of SDG 6 by 12 points from 2015-16 to 2021-22. In 2015-16, the total score of the State in SDG-6 was recorded 51 which varies between 82 as the maximum and 9 as the minimum. The highest score of this SDG was measured in the district Dehradun followed by Tehri, Pauri, and Almora while the lowest score was recorded in the district US Nagar (Table-1). In this year, 5 districts (i.e., Bageshwar, Haridwar, Pithoragarh, US Nagar, and Uttarkashi) were in aspirant category, 7 districts (i.e., Almora, Chamoli, Champawat, Nainital, Pauri, Rudraprayag and Tehri) were in performer category and remaining 1 district (i.e., Dehradun) was in front runner category (Fig. 2A).

In 2021-22, the total score of SDG-6 was recorded 63 which varies between 92 as the maximum and 41 as the minimum. The highest score of this SDG was monitored in the district Dehradun followed by Chamoli, Bageshwar and Champawat while the lowest score was recorded in the district Tehri (Table-2). The study reveals that the progress of the State on SDG 6 is improving slowly there is a need to accelerate the pace. In this year, 2 districts (i.e., Tehri and US Nagar)

were in aspirant category, 8 districts (i.e., Pauri, Pithoragarh, Almora, Nainital, Rudraprayag, Uttarkashi, Haridwar and Champawat) were in performer category and remaining 3 districts (i.e., Bageshwar, Chamoli and Dehradun) were in front runner category (Fig. 2A).

The analysis shows that during the last 8 years, the State's overall progress on SDG-6 has improved from 51 in 2015-16 to 63 in 2021-22. Specifically, in 2015-16, total 5, 7 and 1 districts were in the aspirant, performer, and front runner category, respectively but in 2021-22, total 2, 8 and 3 districts were in the aspirant, performer, and front runner category, respectively. Thus, the study shows that the State is continuously progressing on the environment related SDG-6 by improving the category of districts from aspirant to performer and performer to front runner as illustrated in figure 2A & B.

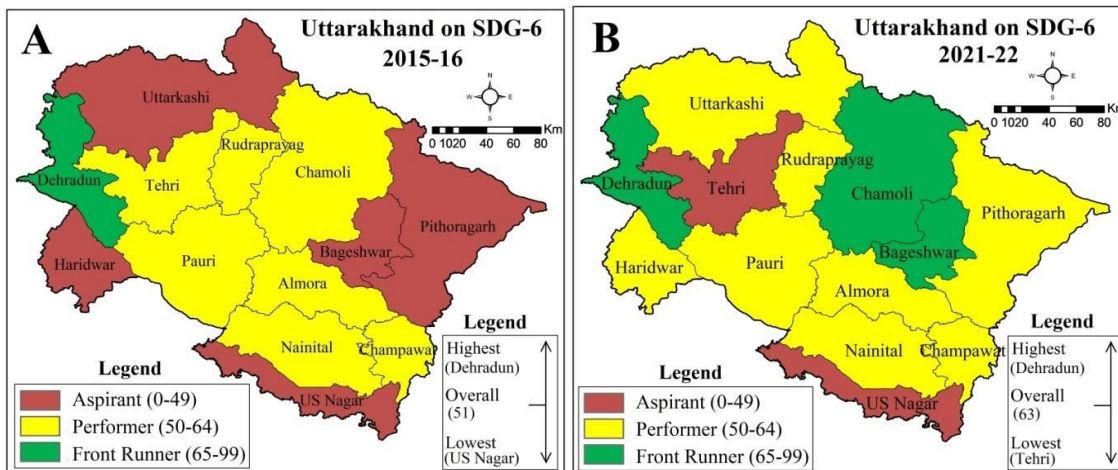


Fig. 2: Progress of Uttarakhand State on SDG-6 in the year (A) 2015-16 and (B) 2021-22.

Sustainable Development Goal-7: This SDG focuses on ensuring access to affordable, reliable and sustainable energy for all. This goal recognizes the crucial role of energy in various aspects of life, from powering homes and businesses to driving economic development. This SDG is closely linked to several other SDGs, e.g., it contributes significantly to SDG 1 (No Poverty) by providing energy access that supports poverty reduction efforts; SDG 3 (Good Health and Well-being) as reliable energy is essential for healthcare services, such as powering medical equipment; SDG 4 (Quality Education) benefits from SDG 7 as energy is essential for lighting schools and enabling educational technologies; SDG 13 (Climate Action) by reducing greenhouse gas emissions and mitigating climate change. The present study shows that Uttarakhand has reduced the score of SDG 7 by 9 points from 2015-16 to 2021-22. In 2015-16, the total score of the State in SDG-7 was recorded 59 which varies between 75 as the maximum and 17 as the minimum. The highest score of this SDG was measured in districts Dehradun, Nainital and US Nagar while the lowest score was recorded in the district Pithoragarh (Table-1). In this year, 5 districts (i.e., Pithoragarh, Tehri, Bageshwar, Chamoli and Champawat) were in aspirant category, 3 districts (i.e., Almora, Pauri, and Haridwar) were in performer category and remaining 5 districts (i.e., Uttarkashi, Rudraprayag, US Nagar, Nainital, and Dehradun) was in front runner category (Fig. 3A).

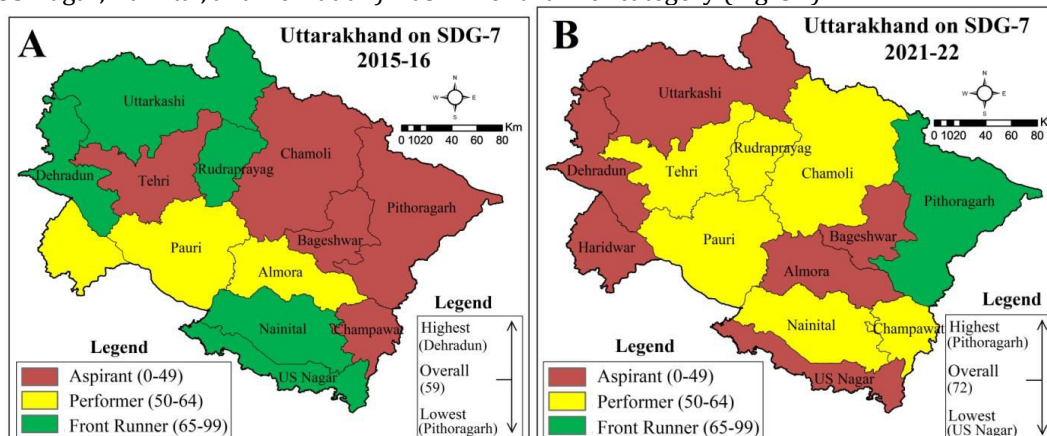


Fig. 3: Progress of Uttarakhand State on SDG-7 in the year (A) 2015-16 and (B) 2021-22.

In 2021-22, the total score of SDG-7 was recorded 50 which varies between 72 as the maximum and 36 as the minimum. The highest score of this SDG was monitored in the district Pithoragarh followed by Champawat, Rudraprayag, and Tehri while the lowest score was recorded in the district US Nagar (Table-2). The study reveals that the progress of the State on SDG 7 is negative so there is much need to accelerate the pace of the efforts. In this year, 6 districts (i.e., US Nagar, Haridwar, Bageshwar, Uttarkashi, Dehradun, and Almora) were in aspirant category, 6 districts (i.e., Chamoli, Pauri,

Nainital, Tehri, Rudraprayag and Champawat) were in performer category and remaining 1 district (i.e., Pithoragarh) was in front runner category (Fig. 3A).

The analysis shows that during the last 7 years, the overall progress of the State on SDG-6 has declined from 59 in 2015-16 to 50 in 2021-22. In detail, in 2015-16, total 5, 3, and 5 districts were in aspirant, performer, and front runner category, respectively but in 2021-22, total 6, 6 and 1 districts were in the aspirant, performer and front runner category, respectively. Thus, the study shows that the State's performance is not good on the SDG-7 the districts have declined their category from higher to lower index category as illustrated in figure 3A & B.

Sustainable Development Goal-12: This SDG focuses on ensuring sustainable consumption and production patterns. In simple terms, it aims to encourage people and industries to use resources wisely and minimize waste. This goal is closely connected to other SDGs, e.g., it contributes in reducing poverty (SDG 1) by ensuring equally distributing resources; combating climate change (SDG 13) by lowering carbon emissions; and good health and well-being (SDG 3) by reducing exposure to harmful substances in the environment. Thus, SDG 12 not only benefits the environment but also plays a crucial role in social benefits.

The study reveals that in 2015-16, the monitoring and assessment of SDG-12 was not started in the State. So, the performance score of the State of the said year is not available but in 2021-22, the monitoring and assessment of this goal was started. In 2021-22, the total score of SDG-12 was recorded 78 which varies between 98 as the maximum and 55 as the minimum. The highest score of this SDG was monitored in district Uttarkashi followed by Nainital, Chamoli, and Tehri while the lowest score was recorded in the district Almora. In this year, 1 district (i.e., Almora) was in performer category and the remaining 12 districts (i.e., Dehradun, US Nagar, Pithoragarh, Haridwar, Bageshwar, Rudraprayag, Champawat, Pauri, Tehri, Chamoli, Nainital, and Uttarkashi) were in front runner category. The study reveals that the progress of the State on SDG 12 is good compared to other environment-related SDGs.

Sustainable Development Goal-13: This SDG focuses on Climate Action, aiming to take urgent measures to combat climate change and its impacts. This goal recognizes the interconnectedness of environmental issues with other Sustainable Development Goals (SDGs). Climate change affects various aspects of our lives, and addressing it contributes to achieving multiple goals. For instance, it intersects with SDG 2 (Zero Hunger) as climate change can impact food security and this also supports SDG 7 (Affordable and Clean Energy) by promoting renewable energy sources. Thus, addressing SDG 13 plays a crucial role in promoting sustainable human well-being and the environment.

The present study reveals that the monitoring and assessment of SDG 13 in the State has not started yet. As we know that the changing climate has become a global environmental issue and the Himalaya is too sensitive to climate change. After being a Himalayan State, in Uttarakhand, the process of monitoring and assessment of SDG 13 has not started. The study strongly suggests that the monitoring and assessment of SDG 13 should be started as soon as possible to take urgent measures to combat climate change and its impacts.

Sustainable Development Goal-14: This SDG focuses on life below water, aiming to conserve and sustainably use the oceans, seas, and marine resources. This goal recognizes the vital role of oceans in supporting life on Earth. SDG 14 is closely linked to other Sustainable Development Goals (SDGs) because the health of our oceans affects various aspects of global well-being. For instance, achieving SDG 14 contributes to ending poverty (SDG 1) by ensuring that coastal communities dependent on marine resources have sustainable livelihoods. It also connects to zero hunger (SDG 2) by promoting sustainable fisheries and aquaculture. Moreover, protecting marine ecosystems under SDG 14 positively impacts climate action (SDG 13) by mitigating the impacts of climate change on oceans.

The present study reveals that the monitoring and assessment of SDG 14 in the State is not started yet. As we know a good aquatic ecosystem is very important for the existence of life on the earth. Uttarakhand being the home of mighty rivers and number of lakes, there is still no such a mechanism developed for monitoring and assessment of SDG 14. The study strongly suggests that the monitoring and assessment of SDG 14 should be started as soon as possible to protect the life below water.

Sustainable Development Goal-15: This SDG focuses on Life on Land, aiming to protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation. In simple terms, it's all about taking care of the Earth's land and the life that depends on it. Now, think, why is this goal important for other SDGs? Well, imagine a giant puzzle where each piece represents a different goal. SDG 15 is like the base of this puzzle because it involves the very ground we walk on and the homes of many plants and animals. If we do not protect our land, it becomes much harder to achieve other goals. For instance, healthy land helps in growing food (SDG 2) and provides clean water (SDG 6). It is also essential for combating climate change (SDG 13) because forests act like nature's air purifiers.

The present study shows that the Uttarakhand State has reached in achiever category. In 2015-16, the total score of the State in SDG-15 was recorded 100 which varies between 100 as the maximum and 50 as the minimum. The highest

score of this SDG was measured in 10 districts while the lowest score was recorded in the district US Nagar (Table-1). In this year, 1 district (i.e., US Nagar) was in performer category, 2 districts (i.e., Haridwar and Pithoragarh) were in front runner category and remaining 10 districts (i.e., Tehri, Bageshwar, Chamoli, Champawat, Almora, Pauri, Uttarkashi, Rudraprayag, Nainital and Dehradun) was in achiever category (Fig. 4A).

In 2021-22, the total score of SDG-15 was recorded 100 which varies between 100 as the maximum and 50 as the minimum. The highest score of this SDG was measured in 10 districts while the lowest score was recorded in the district US Nagar (Table-1). In this year, 1 district (i.e., US Nagar) was in performer category, 2 districts (i.e., Haridwar and Pithoragarh) were in front runner category and remaining 10 districts (i.e., Tehri, Bageshwar, Chamoli, Champawat, Almora, Pauri, Uttarkashi, Rudraprayag, Nainital and Dehradun) was in achiever category (Fig. 4B).

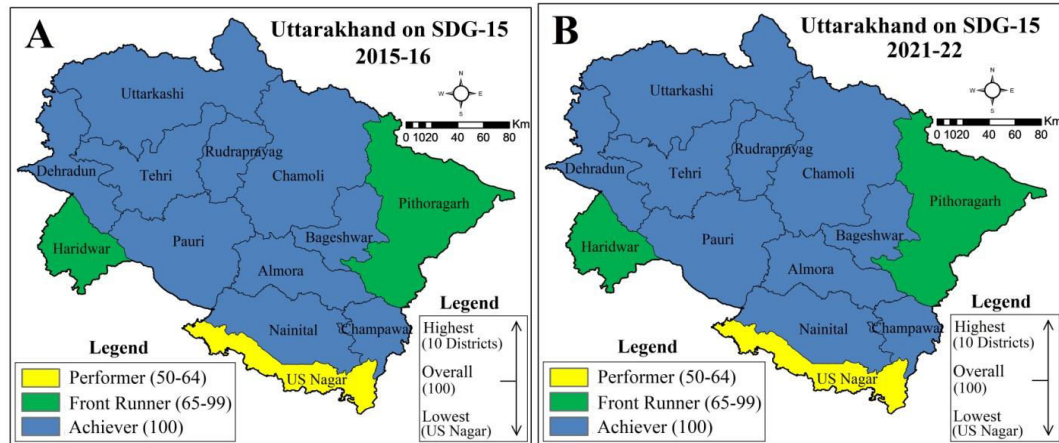


Fig. 4: Progress of Uttarakhand State on SDG-6 in the year (A) 2015-16 and (B) 2021-22.

The analysis shows that during the last 7 years, the overall progress of the State on SDG-15 is satisfactory. The study reveals that in 2015-16, total 1, 2 and 10 districts were in performer, front runner, and achiever category, respectively but in 2021-22, total 1, 2, and 10 districts were found in performer, front runner and achiever category, respectively. Thus, the study shows that the State is continuously progressing on the environment-related SDG-15 by improving the category of districts from aspirant to performer and performer to front runner and front runner to achiever (Table-1).

4. Conclusion

In conclusion, taking care of the environment, like protecting the land, forests, and animals, is like being good stewards of our shared home. The study aims to study the progress of Uttarakhand State on SDGs related to environmental sustainability. The study reveals that six SDGs, i.e., goals 6, 7, 12, 13, 14, and 15 are directly or indirectly related to the natural environment. After the launching of SDGs in 2015, eight years have been completed and only 7 years are rest now. In this view, this is very important to examine the progress status of the Himalayan state Uttarakhand. The present study concludes that the progress of the State is not satisfactory because after eight years of execution of SDGs, the monitoring and assessment work has started only in environmental-related SDGs 6, 7, 12, and 15 and the remaining goals 13 and 14 are not under monitoring and assessment process still. There is no doubt that if the environmental issues are not addressed on priority these will negatively affect other achievements significantly. Thus, the study concludes that all the SDGs related to the environment need special attention and strongly recommends the immediate starting of monitoring and assessment process of unmonitored environmental-related SDGs because this is well proven in this article that all the SDGs are strongly interlinked with each other, therefore, this is very important to pay special attention on each SDGs.

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