

ISSN 0976-786X

THE
GOA

GEOGRAPHER

A Peer Reviewed Journal

VOL. XI No. 1, Dec. 2014



**THE
RESEARCH JOURNAL OF GEOGRAPHERS' ASSOCIATION, GOA (GAG)**

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METAMORPHOSIS IN MEDIUM SIZED TOWN: APPRAISING MARGAO, GOA

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Abstract

Land use and land cover changes is very important today in order to have proper planning and utilization of natural resources and their management. The land cover data documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. Whereas land use shows how people use the landscape whether for development, conservation, or mixed uses. The last half century has been characterized by a continuing process of urbanization which led to various developments of towns and therefore brought about a change in the land use and land cover pattern.

The land use of a town is a dynamic phenomenon influenced by its location, the nature of socio-economic activities, resources and transportation facilities. Margao, the commercial capital of Goa and the headquarters of the South Goa district over the centuries has undergone physical and cultural metamorphosis characterized by large scale intensification of commercial activities and change in the land use pattern. Therefore, the following research focuses on the changing pattern of land use of Margao town of two different time periods (2001 and 2011). Also ward wise change in land use pattern for two time periods 2001 and 2011 has been done. For the changing pattern of land use and land cover of the town change detection method has been carried out along with the use of Arc GIS 10, GIS software to prepare the maps. Simple descriptive statistics has been used to carry out the analysis.

Rapid urban growth and emergence of the town and cities has brought in dynamics in land use /land cover. The analysis and mapping indicates that there is a significant increase in built-up area. It is also noted that substantial amount of agricultural land and dense vegetation area vanished due to rapid urbanization of the town.

Key words: *Land Use/Land cover, metamorphosis, rapid urban growth, emergence of town.*

Introduction

Historically, cities have functioned as the cradle of civilization. Modern politics, economies, and cultures, are all shaped in urban environments. In today's world, majority of people live in cities and their importance continues to grow (<http://www.as.miami.edu/urbanstudies/>).

It has been observed that the urban population of the world has been growing rapidly than the rural population ever since the emergence of the first urban settlement of the world scene. Urban centre once established tends to influence the whole socio-economic milieu of the region and emerge as center of power. This has given rise to a continuing process of transformation of a rural society into an urban society. These urban agglomerations display dispersed chain of production unit and service institutions for balanced regional growth. Infrastructure and industrial development remains by and large concentrated in urban areas, more so in cities. The city draws itself into a large number of rural people and develops into a rapidly growing industrial, commercial and infrastructural centre and thus, offer opportunities for employment, education, trade, industry, recreation, health, etc. the strategy of urban development should act as a catalyst for the improvement of the city region.

Cities function as motors for social and economic development and are vital for common integrated planning. They are also basic service providers for the whole region. It is essential that urban development and planning goes hand in hand with integrated development of the hinterland. Towns are the growth centers and micro scale studies enable to understand the metamorphosis of transformation.

(http://urbact.eu/fileadmin/Projects/CityRegion_Net/outputs_media/Folder.pdf)

Objective

The objectives of this research are as follows

1. To analyze the transformation of land use and land cover of Margao of two time periods (2001 & 2011)
2. To study and understand the forces that lead to urban expansion of the town

Database and Methodology

This study is purely based on secondary data sources which include Governmental as well as Non-Governmental publications, books, research projects, journals and web based resources on the related topic.

Since the research focuses on the changing pattern of land use of Margao town of two different time periods(2001 and 2011), change detection method has been used along with the use of Arc GIS 10, a GIS software to prepare the maps. Also ward wise land use change for two time periods 2001 and 2011 has been carried out. The main forces that lead to urban expansion of the town have also been found out.

Study area: Goa and Margao

Goa nestled in the Sayadhri on the Western Coast of India covers an area of 3,702 sq. kms. Administratively, the state is divided into two districts i.e. North Goa District and South Goa District comprising of 12 talukas with 443 villages and 70 towns (Census of Goa, 2011). According to 2011 Census, about 62.17% of Goa's population lives in urban areas. This is considered to be the highest proportion of urban population in India. South Goa (64.6%) is more urbanised compared to North Goa (60.3%). In South Goa, the two most urbanised talukas are Mormugao (85.6%) and Salcete (72.2%). Salcete is the prominent taluka of South Goa District comprising of 8 towns and 44 villages (Census of Goa, 2011).

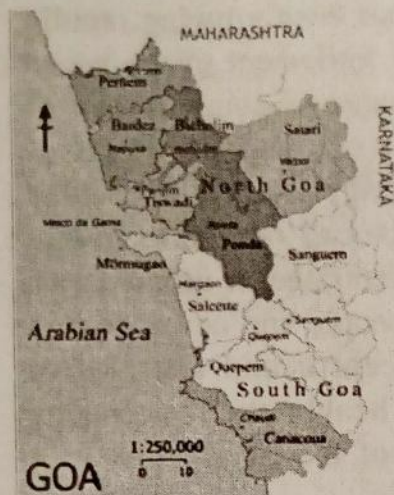


Fig.no: 1. Map of Goa



Fig.no: 2. Map of Salcete Taluka

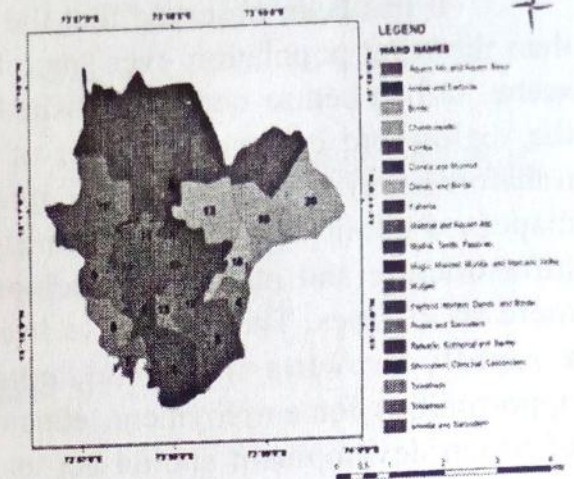


Fig.no: 3. Ward Wise Map of Margao

Source: Prepared by researcher based on Digitized Toposheet and Administrative map of Goa)

It is located along the coast of Arabian Sea, surrounded by Mormugoa, Ponda and Quepem taluka. Among the towns of Salcete taluka, Margao town is the biggest and major urban settlement. Margao is situated in a beautiful plain in the proximity of river Sal. According to the 2011 Census, Margao is an Urban Agglomeration coming under category of Class I UAs/Towns. The total population of Margao is 106,528 (Census of Goa, 2011). The male population is 54,720 while female population is 51,808. The literacy rate of this town is 90.02% which is higher than National Urban average of 85 %. Literacy rate for male and female stood at 93.06 % and 86.80 % respectively. The sex ratio of female to male was found higher with the figure of 947 females against national urban average of 926 females per 1000 males. For children (0-6 age), girls were 951 per 1000 boys against national average of 902 females per 1000 males.

At the time of Portuguese rule, it was in a flourished condition and thickly populated. All communities were living in peace and harmony. In 1922, it was designated as a town; thereafter the growth of the town has been significant both in terms of population and space utilization. In the Post Liberation era, due to intensification of commercial activities, the growth has been significant. Today, Margao is described as a synthesis of a wonderful past and vibrant present, successfully blending the both. The town experienced a new phase of urbanization which witnessed large scale intensification of commercial activities and change in the land use pattern. Lately, due to over congestion and spatial sprawl of the town, planners felt the need to reorganize the layout of the commercial district. Today, Margao witnesses creation of new town nuclei. The new opportunities created had a major impact on demographic adjustments, migration patterns and spatial organization.

Discussion

The land use/land cover pattern of a region is an outcome of natural and socio-economic factors and their utilization by man in time and space. Land is becoming a scarce resource due to immense agricultural and demographic pressure. Following is the land use/land cover of Margao of two different time periods.

Digitized maps of Margao of two different time periods; 2001 & 2011



Fig.no:4: Digitized Map of Margao, 2001

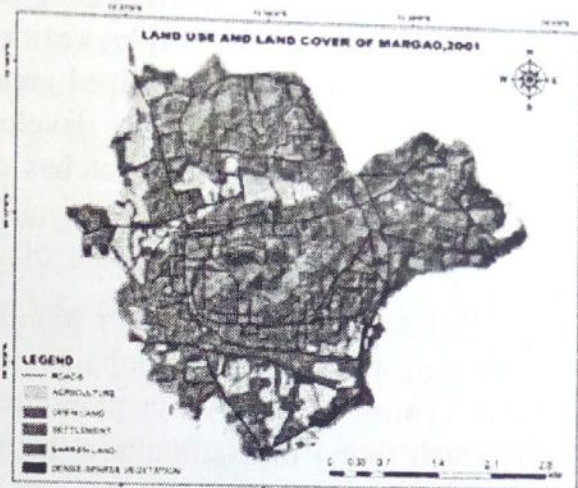


Fig.no:5: Digitized Map of Margao, 2011

Source: Prepared by researcher by using Arc GIS 10

Table No.1: Land use and land cover distribution of Margao (2001 & 2011)

Sr.No	Categories	Percent of area	Percent of area covered 2001	Percent changed covered 2011
1	Natural Vegetation	1%	1%	-
2	Plantations	23%	24%	9.09
3	Agriculture	18%	8%	-55.5
4	Built-up Area	53%	67%	26.41
5	Barren land	6%	0%	-

Source: Compiled by researcher based on change detection calculation

In 1971, the Standard Urban Area was demarcated for Margao which included the Margao Municipal Council. Margao was declared as an Urban Agglomeration, which included the Margao Municipal area and two out-growths-Navelim and Aquem in the next decade, subsequently the adjoining villages' i.e, Benaulim, Seraulim. Twenty years down the line, the situation is different. Benaulim and Seraulim were declared as Census towns.

The South Goa Planning and Development Authority (SGPDA) has classified different land use categories for Margao town like residential, commercial, Industrial, public and semi-public and recreational. The core area of the town shows a high concentration of commercial, public and semi-public utility institutions. With the spatial expansion of the town, the commercial land use has been extended in a linear axis, in ribbon development along the transport routes. Although there are multi-storied buildings, one still finds that the town has retained the ambience of the Portuguese era for instance the Municipal building which is located in the heart of the city. Location for residencies shows distinct phases,

coinciding with the development of the town. Initially development was aligned along the main streets e.g: Aquem-Margao road, Borda-Margao road. Many commercial and Governmental institutions besides residential units were located along these streets, which have become highly commercialized areas. Driven by the commercial potential of the CBD, the adjacent land use of the newly developed commercial residential area shows a process of transformation and succession. Patches of agricultural land can be seen (2011) all over the town. This shows that agriculture prevailed during the Portuguese era and due to globalization today there has been transformation of agricultural land to built-up land.

The percent of change for plantations is positive as it is increasing but at a slower pace. Though it is the age of globalization the populations that live along the fringe areas of the town continue to carry out plantations. There is a drastic change in agriculture with -55.5% which shows that agricultural land has been converted into built-up areas with 24.41% increase in 2011.

Specialized markets have come up at different places like the Gandhi Vegetable market near Pimpal Katta. In fact all around the town one finds dotted residential complexes and independent bungalows belonging to middle to high income group. Slums have also become a part of the town found in the part of Monte hill and along the railway line. The Margao Housing Board Colony, Aquem, Fatorda, Borda, Vidyanagar, Madel are some of the newly developed areas of the town.

Though there has been drastic decline in the area under agriculture i.e. from 6.05 sq. kms to 2.12 sq.kms, a large tract of agricultural land can be still observed all around the town mainly concentrated along the left bank of the River Sal. Orchards are found largely in the fringe areas and along the slopes of the Monte Hill.

Except the old recreational lands like the municipal garden, most of the modern recreational sources have been pushed to the outskirts of the congested areas like the

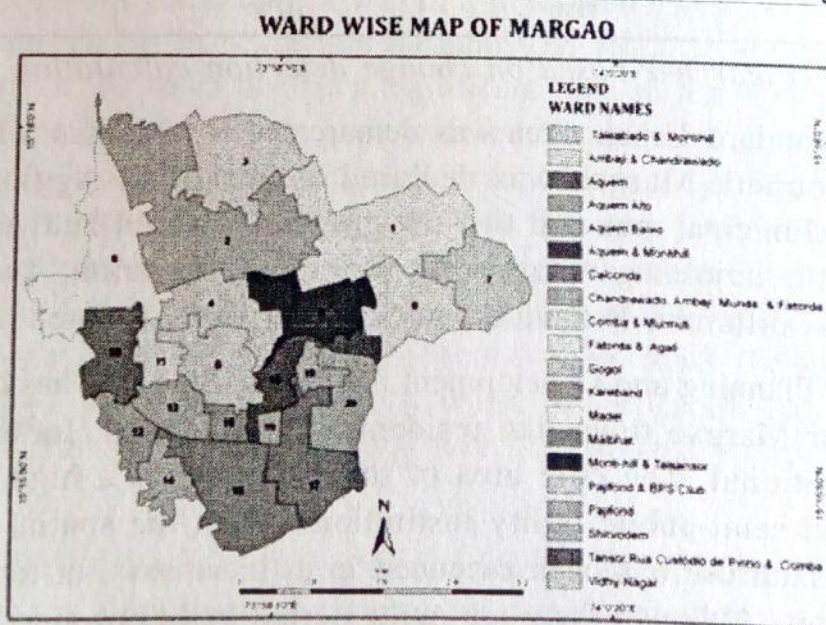


Fig.no:6: Ward Wise Map of Margao

Source: Compiled by Researcher Based on Municipal boundary map info on Google earth

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prestigious Nehru Stadium and the sports complex, which has been built in Fatorda. Fatorda has come to limelight due to the emergence of the stadium, Rabindranath Bhavan, the Inter State Bus terminus and the commercial complex by SGPDA (South Goa Planning and Development Authority). These are the efforts of deliberate planning from nineties onwards.

Ward Wise Land Use / Land Cover Distribution of Margao

Table no.2& 3: Ward wise Land use/Land cover & change detection of Margao

WARD WISE LAND USE AND LAND COVER CLASSIFICATION OF MARGAO

WARD NUMBERS	NATURAL VEGETATION			PLANTATION			RIVER		
	Spatial coverage of 2001 Area in sqmts	Spatial coverage of 2011 Area in sqmts	change	Spatial coverage of 2001 Area in sqmts	Spatial coverage of 2011 Area in sqmts	change	Spatial coverage of 2001 Area in sqmts	Spatial coverage of 2011 Area in sqmts	change
Margao (M CI) WARD NO.-0001	2675.35	0	-100				2675.35	2675.35	0
Margao (M CI) WARD NO.-0002				7300.54	7255.54	-0.61639			
Margao (M CI) WARD NO.-0003	169635.48	145986.99	-14.0421	16672.91	16662.91	-0.06			
Margao (M CI) WARD NO.-0004									
Margao (M CI) WARD NO.-0005							539.8	537.8	-0.37
Margao (M CI) WARD NO.-0006				11756.85008	11756.85	0			
Margao (M CI) WARD NO.-0007									
Margao (M CI) WARD NO.-0008							14043.12	14041.13	-0.014
Margao (M CI) WARD NO.-0009							5912.38	5920.39	-0.034
Margao (M CI) WARD NO.-0010									
Margao (M CI) WARD NO.-0011									
Margao (M CI) WARD NO.-0012				5486.98	5485.98	-0.018			
Margao (M CI) WARD NO.-0013									
Margao (M CI) WARD NO.-0014				42944548.46	4294453000	0			
Margao (M CI) WARD NO.-0015									
Margao (M CI) WARD NO.-0016							28294.28	28288.28	-0.008
Margao (M CI) WARD NO.-0017									
Margao (M CI) WARD NO.-0018									
Margao (M CI) WARD NO.-0019				163.06	163.06	0			
Margao (M CI) WARD NO.-0020	47.911	0	-100						

WARD WISE LAND USE AND LAND COVER CLASSIFICATION OF MARGAO

WARD NUMBERS	AGRICULTURE			BUILT - UP AREA			BARREN LAND		
	Spatial coverage of 2001 Area in sqmts	Spatial coverage of 2011 Area in sqmts	change	Spatial coverage of 2001 Area in sqmts	Spatial coverage of 2011 Area in sqmts	change	Spatial coverage of 2001 Area in sqmts	Spatial coverage of 2011 Area in sqmts	change
Margao (M CI) WARD NO.-0001	856003.26	0	-100	1198340.27	1032578.05	51.26	281746.30	0	-100
Margao (M CI) WARD NO.-0002	175392.75	0	-100	1091957.71	1323865.02	21.24	278225.72	0	-100
Margao (M CI) WARD NO.-0003	77044.32	73424.7	-4.7	829614.79	1143747	17.86	274130.73	0	-100
Margao (M CI) WARD NO.-0004	126369.58	126366.54	0	205967.4	205973.65	0			
Margao (M CI) WARD NO.-0005	432774.6	444075.81	2.61	459603.5	459666.82	0.01			
Margao (M CI) WARD NO.-0006	474877.82	482842.84	1.7	531001.64	548664.29	3.38			
Margao (M CI) WARD NO.-0007	80431.57	71748.1	-10.8	233349.65	238735.64	2.31			
Margao (M CI) WARD NO.-0008	143107.44	145030.36	1.34	302047.03	310542.81	2.85			
Margao (M CI) WARD NO.-0009	178999.83	176207.65	-1.56	347290.1	357175.2	2.9			
Margao (M CI) WARD NO.-0010				472128.66	472128.66	0			
Margao (M CI) WARD NO.-0011				368118.43	368118.43	0			
Margao (M CI) WARD NO.-0012	52283.49		-100	830851.76	835364.79	0.54			
Margao (M CI) WARD NO.-0013	5915.27	7841.53	-20.91	211730.24	219654.18	3.76			
Margao (M CI) WARD NO.-0014	981.47	745.48	-24.04	230429.83	259467.77	12.6			
Margao (M CI) WARD NO.-0015				980357.9	980407.9	0.01			
Margao (M CI) WARD NO.-0016	895815.25	0	-100	538582.73	604662.66	28.98			
Margao (M CI) WARD NO.-0017	13929.42	11937.18	-14.3	459508.62	459549.36	0.02			
Margao (M CI) WARD NO.-0018	22757.71	23423.76	2.93	329572.85	330036.02	0.14			
Margao (M CI) WARD NO.-0019	123287.53	0	-100	404357	609569.3	50.75	195750.1	0	-100
Margao (M CI) WARD NO.-0020				566277.79	699171.89	23.47	249163.66	0	-100

Source: Compiled by researcher based on area calculation of digitized LULC using Arc Gis 10

The figures presented in the above table represent the static area of each land use land cover category for each study year (2001 & 2011) ward wise land use and land cover classification of Margao. It depicts the area under each LULC category in square meters and also percentage change in each LULC category.

The land cover and land use of Margao is classified in to six classes. In Margao, the ward wise classification shows the changing land use pattern. There is change from 2001 to 2011 in land use and land cover of the town because of urbanization. This town is mostly dominated by built-up area. Some wards are totally covered by the built-up area due to increased population and construction activities. Settlements are mainly concentrated along the traditional routes and some wards of Aquem, Borda, Comba and Madel have high concentration of built-up area. Other wards show the moderate concentration of built-up area. In 2011, almost all the agricultural land has been completely decreased due to expansion of the town. The casual look emphasis that there was not much of planning and was at its infancy.

If study on the Margao town is done as per the concentric model, the core area of the town is highly concentrated of commercial and public and semi- public utility institutions, shops etc, the Central Business Zone. As we go away from the city there is high concentration of the residential houses mainly apartments, this area belongs to mostly low income people who work in the city. After these zones the area is occupied by the stores, warehouses and small scale industries. As we reach to the outskirts of the city limits, the area is occupied by bungalows and this area zone is located at the transitional area of city and villages, mostly dominated by the high income group people. Slums have become part of the town, the slum areas are found in parts of Monte hill, Azad Nagar, Calconda and below the Khareband bridge along the railway line. With the spatial expansion of the town, the built-up area has been extended in a linear axis, in ribbon development along the major transport routes. Initially development was aligned along the main street.eg. In Aquem- Margao road, Borda-Margoa road in 2001 and in 2011 it started expanding along Nuvem-Margoa road.

The ward wise percentage change shows that area under agriculture has declined in some wards like; 1, 2, 12, 16, and 19(100%). All the wards show increase in built-up area, some wards are showing increase up to 50%. The area under barren land has totally declined; the wards which had barren lands in 2001 are showing 0% in 2011, this is because the barren land in now occupied by the built-up area.

Driving Forces to Urban Expansion

Urban expansion is the combined result of numerous factors. Urban expansion in deferent town or at deferent time intervals always has deferent dominant factors. According to the two main indexes of urban expansion i.e. Changing land use pattern and Decade wise population analyzed above, the urbanization level has increased. In this study, the driving forces to this urban expansion resulted from the following main factors.

Rapid economic development

Goa has come up as the major tourist destination in India and International. Many tourists' lakhs of domestic as well as foreign tourist visit Goa and it is a major source of income to Goa. Salcete taluka in the economic development is taking place at very high phase, due to high income of the people. Most of the population in Margao is engaged in secondary and tertiary activities and therefore it is known as 'Commercial town of Goa'.

Industrialization

Establishment of new industries in countryside increases impervious surfaces rapidly. Industry requires providing housing facilities to its workers in a large area that generally becomes larger than the industry itself. The transition process from agricultural to industrial employment demands more urban housing. Due to the location of industries in the periphery area of Margao, this has led to urban expansion of the town. Cuncolim and Verna are the two most important industrial areas that lie on the periphery of Margao.

Lateral expansion possibilities

Though the Margao town and entire Salcete taluka has shown a significant growth both in its area as well as in population, but the constraints lie in the lateral expansion of the city on its setting as it exists. The areal growth of Margao is found to be 4.7 Km² from 1968 to 12.2Km²2011. If this trend continues, sooner or later, the city would encroach up to the neighboring villages and villages will come up as census towns as it is happening now. The Margao town is located at the center Salcete taluka and surrounding the villages in the low lying area since it is located along the coast and the topography shows that it's a plain area so it is highly attracted to human settlement and other activities. During the past few decades urbanization has taken place on agricultural lands around the Margao town and Cuncolim . This expansion has taken place along the arterial routes towards the surrounding villages. Despite the constraints posed on the agricultural land the town is experiencing urban out growth in these areas because of rapid urbanization which is evident from the fact that building activities are heavily taking place in and around Margao and barren lands of the town.

Vertical expansion possibilities

Since constraints that lie on the expansion of the city in the lateral directions and other hand the agricultural lands are squeezing, government has called a ban on the change of land use from agricultural to residential and saturation point is approaching when there will be left no land for lateral expansion. The only alternative left shall be the vertical expansion. In terms of Margao the saturation point is approaching .The present restriction of 50 ft. height for hotels etc. shall have to be relaxed. Construction of high-rise buildings shall have to be made possible by providing the strong designed foundations for the soils generally having low bearing capacity of half a ton per sq. ft. by doing so we can save the open area(barren land) and area under natural vegetation from converting in to the built up area. Urban population is increasing at a faster rate and demands for land for housing purpose and for other construction purpose for eg. Road, industries, parking lot, malls etc are increasing

at very faster rate to save the entire area from being converted to build up area we have to do better planning and look for the possibilities of vertical expansion.

Conclusion

Cities function as motors for social and economic development and are vital for common integrated planning. It is essential that urban development and planning goes hand in hand with integrated development of the hinterland. Towns are the growth centers and micro scale studies enable to understand the metamorphosis of transformation.

The town of Margao has undergone a metamorphosis, which is more apparent in all spheres- demography, commerce, education, social organization etc. Truly it would be stated that the town is attracting as magnet with growing commercial activities and sub-urbanization. Today, Margao has experienced urban sprawl along Fatorda, Davorlim, Aquem, Navelim, Seraulim and Khareband areas. Residential and commercial sectors have experienced a boom especially the hotel industry as Margao is a tourist destination also.

Margao is described as a synthesis of a wonderful past and vibrant present, successfully blending the both. The subsequent socio-economic development and growing importance as commercial centre, stimulated large scale influx of migrants from all parts of India. The town experienced a new phase of urbanization which witnessed large scale intensification of commercial activities and change in the land use pattern which led to the transformation. Despite the constraints posed on the agricultural land the town is experiencing urban out growth in these areas because of rapid urbanization which is evident from the fact that building activities are heavily taking place in and around Margao and barren lands of the town.

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Declaration

We, declare that the above article is original and has not been published by us or by any one in any Journal or book.

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