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Management of Bio-Resources An insight through Peoples Biodiversity Register (PBR's)

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ABSTRACT

A study was taken to document the bio-resource of Ginnedhari village in Telangana, through Peoples Biodiversity Register (PBR'S) for the year 2018-2019. The documentation was done by following the NBA (National Biodiversity Authority) performa, the data was collected from the village through interaction data collection from officials, and discussion with village people. The indigenous knowledge of various aspects of local biodiversity indicates that under the agro biodiversity 31 types of crops and 13 types of pest of crops were identified followed by 13 species of weeds, and 4 types of fruit plants. Among the wild plant biodiversity 36medicinal plants, 4 fumigator plants, 12 timber plants, and 11 ornamental plants were identified. The wild relative plant biodiversity under the plant identified are shrubs 9, herbs 4, grasses 4, and climber 2, 6 types of wild animals, 12 types of wild birds, and 8 types of reptiles are present, the data about domesticated biodiversity indicates 6 types of mammals, 2 types of birds and 2 types of reptiles. The documented bio resources are a ready reckoner to the village people BMC (Biodiversity Management Committee), TSBB (Telangana State Biodiversity Board), and NBA for resource conservation and access benefit sharing, patenting, and economic value to the specific village.

Keywords: *People's Biodiversity Register, Indigenous knowledge, Documentation, Agro-biodiversity, Medicinal plants, conservation.*

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INTRODUCTION

The term biodiversity has become a buzzword of the present world because it is now increasingly being seen as the resource of the future. The relationship between the people and biodiversity continues to change ever since mankind's inception. This relationship creates and modifies the folk ecological knowledge and wisdom of the local biodiversity. In India, biological diversity is taken care of by the cooperation of masses of people, as many of them still depend on it for their day-to-day sustenance. In recognition of this reality, India's Biological Diversity Act, 2002 proposes to decentralize the management of biodiversity to the level of Panchayati Raj institutions (three-tier councils starting from village, development block, and district) (Biological Diversity Act-2002), municipalities and city corporations, by establishing Biodiversity Management Committees (BMC) in these local bodies to complement the State Biodiversity Boards and the National Biodiversity Authority (MOEF2004). Much of the knowledge of the status and dynamics of biodiversity also resides with the people at the grassroots [1-3]. Thus the only reliable information on the status and dynamics of the natural medicinal plant populations, albeit limited to their localities, resides with forest produce collectors who are employed by agents of pharmaceutical companies, or with folk practitioners of herbal remedies. Since effective action can only flow from a sound base of knowledge and support management

effort by a countrywide system of inventorying and periodically monitoring biodiversity along with the associated knowledge [4-5]. Due to the tremendous variation in the distribution and uses of biodiversity from place to place, this documentation is highly local and time specific. Biodiversity Management Committees at the level of the local bodies are supposed to undertake this detailed documentation. The rules promulgated under the Biological Diversity Act term such local level documentation as "People's Biodiversity Register (PBR)". It is one, albeit the most novel and significant, of the elements of the overall "Biodiversity Information System (BIS)" that is developed at the national level. The biodiversity of the areas is conserved by the local community for their cultural and spiritual need with their traditional wisdom. But to date there is no inventory made for the same with the participation of people and their traditional knowledge [6-7]. Documentation of knowledge associated with biodiversity is pertinent in the context of the Biological Diversity Act, 2002 of India and also the provisions of CBD (Convention on Biological Diversity) for equitable sharing of benefits with knowledge holders. To support this objective, the elaborated "People's Biodiversity Register" (PBRs) has been included in the documentation of local biodiversity, relationships and their knowledge of biodiversity in the context of medicinal as well as other uses, their ecological knowledge, and their perceptions of on-going and desired patterns of biodiversity management [8-9]. Initially in 1996 a series of PBRs have been prepared with the help of networks of environment-oriented NGOs and educational institutions at the level of High School, Undergraduate, and Degree Colleges, with experience, growing availability, and capability of tools of modern information and communication technology. The programme has been refined so that much of the information so generated can be pooled together and organized with the help of a Rational Database Management System

2.0 Study area

Komaram Bheem district is one of the 31 districts in the state of Telangana. Komaram Bheem was carved out of Adilabad district and was made a district on October 11, 2016. Komaram Bheem district is spread across 4,878 square kilometers and has a population of 5,92,831 as of 2011 Census data. District headquarters is situated in Asifabad, which has a population of 58,511. Ginnedari is a Village in Tiryani Mandal in Komaram Bheem Asifabad District of Telangana State, India. It is located in 19.1973N, 79.239E coordinates, and 210 meters above sea level and towards 3 kilometers East of District headquarters Komaram bheem Asifabad. Biryani (4 km), Ullipitadorli (4 km), Devaiguda (6 km), Pangidi Madra (8 km), Gambiraopet (9 km) are the nearby villages to Ginnedari. Ginnedari is surrounded by Komaram Bheem Asifabad District towards the North, Rebbena Mandal towards the East, Kasipet Mandal towards the East, and Dandepally Mandal towards the South. Bellampalle, Kagaznagar, Mandamarri, and Mancherial are the nearby cities of Ginnedari. The total area of Ginnedari village is 641.42 hectares; out of which 125.7 hectares is a non-agricultural area and 5.72 hectares is a total irrigated area. The study area is depicted in Figure1 and 2.

Figure 1: Adilabad District Map

Figure 2: Location of Ginnedari Village

METHODOLOGY

For the present study, Ginnedhari village was selected. The process of PBR preparation was designed into three steps which are as follows:

1. Primary Data Collection

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2. Secondary Data Collection
3. Process of PBR Preparation

3.1 Primary data collection

Data collection was done as per NBA, PBR formats regulating (Agro biodiversity) crops, weed, medicinal plants, ornamental plants, fruit plants, (Domesticated biodiversity) domesticated plants, domesticated animals, (wild biodiversity) wild plants, and wild animals forest data, etc. under human resources, data (primary information) was collected on social and economic aspects, population, number of households, literacy rate, drinking and irrigation water source, livestock, and sanitation, agriculture details etc.

3.2 Secondary data collection

Secondary data such as survey maps indicating land ownership, topographic maps, aerial photographs, satellite imagery, district gazetteers, human livestock census data, land use and cropping patterns, forest working plans, rainfall, and river flow statistics were collected from respective departments.

3.3 Process of PBR Preparation

Step 1: Interaction with the already formed Biodiversity Management Committee (BMC) by the Telangana Biodiversity Board.

Step 2: Sensitization of the public about the study, survey, and possible management of the natural resource.

Step 3: Interaction with knowledgeable members in the identification and collection of data on biological resources and traditional knowledge.

Step 4: Collection of data. Data collections include a review of literature on the natural resources of the districts, Participatory Rural Appraisal (PRAs) at the village level, household interviews, individual interviews with village leaders and knowledgeable individuals, household heads, key actors of the panchayat raj institutions, and NGOs and direct field observations.

Step 5: Analysis and validation of data in consultation with the technical support group and BMC.

Step 6: Preparation of People's Biodiversity Register (PBR) according to NBA formats.

Step 7: Computerization of information and resources.

The basic methodology used for this study was to approach the local people directly by means of individual, and group discussion and collect information. Data was collected as per the PBR Proforma from NBA (National Biodiversity Authority), New Delhi "People's Biodiversity Register" methodology manual and data formats. The National Biodiversity Authority formats have been undertaken to understand the indigenous knowledge regarding local resources- flora, fauna, livelihood options, perceptions, and motivations of different biodiversity [10-14].

The following techniques were adopted for the preparation of PBR:

1. Interviews: Information related to the history of the village, local institutions and decision making, landscape aspects, and biodiversity were collected from village heads and knowledgeable individuals, through personal interviews. Local communities were shown local field guides on various taxa (e.g. birds, mammals, butterflies, and reptiles) and asked to list the species found in their village, their local names uses, and their current status.

2. Group discussions: were conducted with village elders and individuals who are well versed with the local biodiversity. Discussions were mainly held to validate the information gathered at various levels.

3. Field visits: were carried out with members of the village BMC council and local knowledgeable individuals to document the bio-resources of the village. For the fauna survey, opportunistic documentation was carried out and species observed were recorded.

4. Village BMC Council Meetings: A village BMC council meeting was conducted at the village council hall involving all the stakeholders. The village council members and the village development board members were present at the meeting along with women group members. Village health workers and other officials were also

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present during the meeting. This meeting helped to understand various issues the conservation of the conserved area and to identify possible solutions to tackle the problems.

Extensive interviews were conducted by using an interview schedule that consists of both open and closed-ended questionnaires. Group discussions and resource mapping were the other tools used to collect primary data. The secondary data was collected from the reports of the Forest Department, census data, and reports published by various agencies. The information was collected by visiting the village in person.

RESULTS AND DISCUSSION

The preparation of PBR involves filed investigations and compilation of the information collected into the PBR document [15-22]. The process of field investigation includes the following components, identifying different biodiversity user groups, identifying knowledgeable individuals in different aspects of the distribution of biodiversity, interviewing individuals and groups with members representing different user groups, mapping the study site landscape, visiting representative elements of this landscape, and also to document the species that are present in the village as per the people knowledge, according to the NBA Format.

Population composition

According to 2011 census, the total population of the Panchayat was 1583, out of which 775are males and 808 are females. This Panchayat includes 21 small hamlets and consists of 396 households. The major community is scheduled tribes (gonds).

Socio-Economic Profile

Based on the dependence of biodiversity, the village can be divided into dependent on agriculture, secondary groups dependent on resources like fuel wood collectors and cattle grazers, both directions depending on the local biodiversity, and some government employees, private employees, drivers, construction workers etc. indirectly depending on the local biodiversity. The average monthly income of village is 3000-8000 rupees.

Education and literacy

One primary school, one middle school, and high school are located within this Panchayat limits. Majority of the people including tribes aspire to send their children to schools as they see the education as a way out to escape from their deprived socio economic status. The literacy rate in this village is 50.4% and the female literacy rate is 21.1%.

Socio-cultural Aspects

The villagers have rich cultural heritage, which are visible through their festivals and religious practices. People also perform folk dance especially gussadi in the season of Diwali festival.

Soil and Water

Ginnedheri is located on the Plateau. It contains various types of soils such as black soils and alluvial soil (dubba soil).These types of soil allows plantation of various fruits and vegetable crops like mangoes, cotton ,maize, paddy etc. This area has an average rain fall of about 978.4 mm/year. Ground water is the major source of drinking water in the hamlets. In most of the village areas the people were of the opinion that they get drinking water reasonably well (Number of Tube wells: 30-40, Water Tanks: 1, Number of Hand Pumps: 0 Major Minor Water Tanks: 0), but the major problem was water for agriculture.

The biodiversity data was collected according to the NBA Format:

The data regarding the agro-biodiversity of Ginnedhari village is given in Table 2.

Agro-biodiversity

Ginnedhari is driven mainly by agriculture as far as the economy is concerned. The farmers depend on the rain fed sources of water for irrigation. The major food crop is rice. Other significant crops are cotton, maize etc. Agro-biodiversity data is provided in (table 2), major crops belongs to Poeaceae, Malvaceae, Fabaceae, Cucurbitaceous, Solanaceae family. In agro-biodiversity four types have been identified, among which there are 31 species of crops, 13 species of weed, 4 species are fruit bearing and 13 species of pests.

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Table 2: Agro biodiversity of Ginnedhari Village

Crops		Weeds	
Scientific name	**Local name**	**Scientific name**	**Local name**
Oryza sativa	Vari	*Eragrostistenella*	PiichiGaddi
Cajanuscajan	Kandulu	*Chlorisbarbata*	UppuGaddi
Syzygiumcumini	AllaNeredi	*Daturametel*	Ummeta
Spinaciaoeracea	Pala Kura	*Partheniumhysterophorus*	VayariBhama
GossypiumSps	Patti	*Achyranthesaspera*	Uthareni
Vignaradiata	Pesara	*Tridaxprocumbens*	GaddiChamanti
Manziferaindica	Mamidi	*Cyperusrotundus*	TungaMusta
Phoenix sylvestris	Eetha	*Cynodondactylon*	Garika
Phyllanthusemblica	Usiri	*Tephrosiapurpurea*	Vempalli
Zea maize	Makka	*Solenaheterophylla*	AdaviDonda
Criticumvelgera	Jonna	*Cleome gynandra*	Vaminta
Sorghum bicolor	Jonna	*Phyllanthusamarus*	NelaUsari
Zizyphusjujoba	ReguPandlu	*Citrulluscolocynthis*	VerriPuchakaya
Carica papaya	Boppai	**Total**	**13**
Terminaliaarjuna	Arjuna	**Fruit plants**	
Cocosnuciferav	Kobbari Kaya	*Mangiferaindica*	Mamidi
Tamarindusindica	Chinta	*Psidiumguajava*	Jama
Borassusflabellifer	Tati	*Carica papaya*	Boppai
Lycopersicumesculentus	Tameta	*Punicagranatum*	Daanima
Solanummelongena	Vankaya	**Total**	**04**
Luffaacutangula	Birakaya	**Pests of crops**	
Allium cepa	Vullipaya	*Nilaparvatalugens*	AggiTegulu
Abelmoschusesculentus	Benda	*Scriphophagaincertulus*	KandomPurugu
Moringaoleifera	Munaga	*Nilparvatalugens*	Dooma
Hibiscus cannabinus	Gongura	*Waphalocrosismedimalis*	AakuchutaPurugu
Rumexvesicarius	Chukka Kura	*Psarabipuntalis*	AkkuAnnuPurugu
Coriandrumsativum	Kottimera	*Luecinodes*	KandamPurugu
Cocciniagrandis	Dondakaya	*Bemisiatabaci*	TellaDomma
Menthaspicata	Pudina	*Spodopteralitura*	LaddayPurugu
Murrayakoenigii	Karvaypaku	*Xanthomonasaxonopodis*	AkkuPurugu
Lagenariasiceraria	Sorakaya	*EarisSpp*	Machala Purugu
		Amraseaabiguttula	PachaDoma
Total	**31**	*Bipolaristurcicum*	AkkuPurugu
		Meloidogyna incognita	VeeruPurugu
		Total	**13**

Wild plant biodiversity

The majority of the wild plants can be classified into four categories and belongs to the following families.

Timber Plants -Meliaceae, Moraceae, Anacardiaceae Lamiaceae

Medicinal plants - Moraceae, Fabaceae, Arecaceae, Amaranthaceae, Sapindaceae

Ornament plants -Asteraceae, Asparagaceae, Malvaceae

Fumigatory plants - Meliaceae, Euphorbiaceae, Fabaceae.

Plants with high medicinal values were found in Ginnedari village, which are

Ippapuvvu (*Madhucalongifolia*)-Madhuka flowers are used for fermenting agent, Asava and Arishta Fermented Alcoholic Liquid Medicine Preparation, andArjuna (*Terminaliaarjuna*)- plant mainly used for heart diseases due to its cardio protective and cardio-strengthening properties.

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Table 3: Wild Plant biodiversity of Ginnedhari Village

Medicinal Plants		**Fumigatory Plants**	
Scientific Name	**Local Name**	**Scientific Name**	**Local Name**
Azadhirictaindica	Veepa	*Azadriructaindica*	Veepa
Chrysanthemum Sp	Chamanthi	*Achyranthesaspara*	Uttareni
Tagetus erectus	Banthi	*Tamarindusindica*	Chinta
Rosa	Gulabi	*Ricinuscommunis*	Aamudam
Jasminum	Mallae		
Ocimum sanctum	Tulasi	**Total**	**04**
Crossandrainfundibuliformis	Kanakambaram		
Polianthesustuberosa	Sampenga		
Cocosnucifera	CobbaraChettu	**Timber Plants**	
Nerium oleander	Gannaru	*Tectonagrandis*	Teeku
Hibiscus rosa-sinensis	Mandaram	*Tamarindusindica*	Chinta
Phyllanthusemblica	Vusari	*Mangiferaindica*	Mamidi
Madhucalongifolia	Ippapuvvu	*Azadirachtaindica*	Veepa
Phoenix dactylifera	Yeeta	*Ficusbenghalensis*	Marri
Borassusflabellifer	Thati	*Ficusreligiosa*	Raavi
Moringaoleifera	Munaga	*Ecalyptusglobulus*	JamaoilChettu
Buteamonosperma	Modhuga	*Delonixregia*	Gulmohar
Ficusvenghanensis	Marri	*Acacia nilotica*	Tumma
Ficusglomerata	Medi	*Hardwikiabinata*	Vepi
Ficusreligiosa	Raavi	*Leucaenaluecocephala*	Subabul
Prosopis cineraria	Jammi	*Buteamonosperma*	Moduga
Pithacalobiumdulce	CheemaChinta	Total	12
Tamarindusindica	Chinta		
Tectonagrandis	Teak	**Ornamental Plants**	
Syzygiumcuminii	Neeradu	*Chrysanthemum Sp*	Chamanthi
Sennan auriculata	Tangeḍu	*Tagetus erectus*	Banthi
Phyllanthusniruri	NellaUsiri	*Rosa*	Gulabi
Tribulusterrestris	Pallarukaya	*Jasminum*	Mallae
Cissusquadrangularis	Nallaru	*Ocimum sanctum*	Tulasi
Ocimumtenuiflorum	Tulasi	*Crossandrainfundibuliformis*	Kanakambaram
Abrusprecatorius	Guruvinda	*Portulacagrandiflorum*	Table Rosa
Acheranthesaspera	Uttareni	*Polianthesustuberosa*	Sampenga
Aevervalalata	Pindi Kura	*Cocosnucifera*	CobbaraChettu
Agava Americana	Kalabanda	*Nerium oleander*	Gannaru
Aloe vera	ManchiKalabanda	*Hibiscus rosa-sinensis*	Mandaram
Cleome viscose	KukkaVamintaku	**Total**	**11**
Datura mete	Umetha		
Eclitta prostrate	Gunta Garage Aku		
Tinosporacardifolia	Tippateega		
Dodonaea viscose	Bandera Aku		
Calotropis gigantean	Jilladu		
Abutilon indicum	Thuthurabenda		
Diplocyclospalmatus	LingaDonda		
Allamandacathartica	Allamanda		
Datura metel	Ummatha		
Hibiscus rosasinensis	Mandaram		
Total number	**36**		

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Table 4: Wild Relative Plant Biodiversity of Ginnedhari Village

Trees **Scientific NameLocal Name**		**Shurubs** **Scientific NameLocal Name**	
Tamarindusindica	Chinta	*Heliotropiumindicum*	Danti
Ficusvenghanensis	Marri	*Senna auriculata*	Tangedu
Syzygiumcuminiin	Neeradu	**Grass**	
Pithacalobiumdulce	*CheemaChinta*	*Cynodondactylon*	GarikaGaddi
Phyllanthusemblica	Vusari	*Desmostachyabipinnata*	DabhaGaddi
Tectonagrandis	Teak	*Cymbopogoncitratus*	NimmaGaddi
Ficusreligiosa	Raavi	*Cynodondactylon*	Garika
Prosopiscinereria	Jammi	**Tubers**	
Senna auriculata	Tangeḍu	*Urgineaindica*	AddaviUlli
Herbs	*Ipomoea batatas*	MoramGadda	
Acalypha indica	Kuppichettu	*Maeruaoblongifolia*	BhuchakraGadda
Leucaszeylanica	Thummi	*Gloriosasuperba*	NiruPippali
Celosia spicata	Gunugu	**Climbers**	
Agave americana	Kalabanda	*Cocciniagrandis*	Donda
		Tinosporacordifolia	TippaTiga

Table 5: Domesticated Animal Biodiversity of Ginnedhari Village

Mammals		**Birds**	
Scientific Name	**Local Name**	**Scientific Name**	**Local Name**
Felissylvestriscatus	Pilli	*Gallus gallusdomesticus*	Koodi
Capra aegagrushircus	Mekalu		
Bostaurus	Yeddulu/Aavulu	**Reptiles**	
Bosbubalis	Barrelu	*Ranahexadactyla*	Frog
Ovisaries	Gorrelu	*Hemidactylusflaviviridis*	House lizard
Canuslepusfamiliaris	Kukalu		

Table 6: Various types of biodiversity species in Ginnedari village

Agro Biodiversity		**Wild Biodiversity**	
Type	**Number**	**Type**	**Number**
Crop	31	Shrubs	09
Weed	13	Herbs	04
Pest of Crops	13	Tubers	04
Fruit Plant	04	Grasses	04
		Climbers	02
Domesticated Biodiversity	Fumigatory plants	04	
Type	**Number**	Timber plants	12
Mammals	06	Medicinal plants	36
Birds	01	Ornamental plants	04
Reptiles	02	Trees	09

Domestic animal biodiversity

In Ginnedhari village cluster cattle, dogs and chicken are the three animal groups maintained under domestication by significant proportion of people since many generations. Buffalo, goat and pig have been introduced in the beginning of 20th century. Chicken and goat are purchased only for meat. Majority of the domesticated animals belonging to Bovidae, Canidae, Phasianidae family is shown in the Table 5.

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In domesticated biodiversity three classes of animals have been identified. Among which 6 belong to the class Mammalia, 1 belong to Aves (birds) and 2 belong to Reptilia.

In wild biodiversity ten types have been identified. Among which shrubs consist of 09 species,4 herbs, 4 tubers, 4 grasses, 2 climbers, 4 fumigatory plants, 12 timber plants,36 medicinal plants, 4 ornamental plants and 9 trees species.

the involvement of knowledgeable local people. This data will be further used as a baseline data to strengthen the biodiversity based livelihoods, to strive for sustainable biodiversity conservation with the involvement of locals, to know about the traditional methods of conservation and their practical utilities in the present scenario for creating awareness in the newer generations, to include the local issues in the planning and development process, to regulate the access

Table 7: Wild Animal Biodiversity of Ginnedhari Village

Wild animal		**Birds**	
Scientific Name	**Local Name**	**Scientific Name**	**Local Name**
Oryctolaguscuniculus	Rabbit	*Gallus gallusdomesticus*	Koodi(hen)
Susscrofa	Wild Pig	*Columbidae*	Pavuram
Ursusarctos	Wild Bear	*Psittaciformes*	Ramachiluka
Cercopithecidae	Monkey	*Pavocristatus*	Nemali
Vulpesvulpes	Fox	*Passeridae*	Pichikka
Sciuridae	Squirrel	*Picidae*	Woodpecker
Total	**06**	*Strigiformes*	Gudlaguba(owl)
		Corvus	Crow
Reptiles		*Chiroptera*	Bat
Ranahexadactyla	Frog	*Gruidae*	Crane
Hemidactylusflaviviridis	Lizard	*Anatidae*	Duck
Calotesversicolor	garden lizard	*Acridotherestristis*	Mynah
Bungaruscaeruleus	Kattlapamu		
NajaNaja	Nagupamu	**Total**	**12**
Daboiarusselii	Raktapinjari		
Opheodrys	Pasirikapamu		
Pantherophisobsoletus	Rat snake		
Total	**08**		

Wild Animal Biodiversity

Monkey and wild pigs are commonly seen in this area. Wild boars, also frequently seen are damaging the agriculture crops and5 different type of snakes, 8 types of reptiles, 12 types of birds, and foxes, etc. are present in the forest nearby.

CONCLUSIONS

People's biodiversity registers contains comprehensive information and knowledge of local bio-resources, their medicinal and other uses and traditional knowledge associated with these resources. The necessity to document the information regarding biodiversity in the form of PBR is to know about the existing biodiversity and to strengthen the biodiversity based livelihoods and to strive for biodiversity conservation. The main function of PBR is to documentation of existing data on biodiversity conservation with

to bio-resources , to identify the commercial application of local knowledge for access benefit sharing with the traditional knowledge holders. PBRs give an idea about the complexity of the relationship between people's lives and the local biodiversity. The involvement of local people and the decentralization of management to the lowest level make PBR a unique kind of documentation rather than just a list of species of local flora and fauna.

Consent and Ethical Approval

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors

Competing interests

Authors have declared that no competing interests exist.

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Authors' Contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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