A Review on Genesis and Taxonomic Classification of Soils of Orissa

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As per Soil Taxonomy, the soils of Orissa are divided into four orders namely Alfisols, Inceptisols, Entisols and Vertisols. Inceptisols are most extensive occupying 49% area followed by Alfisols (35%), Entisols (10%) and Vertisols (6%) (Sahu and Mishra, 2005).

Black soils of Bhawanipatna are derived from basic granulites, pyroxenes and charnockite rocks; soils of Luisinga (Bolangir) are derived from calcic-plagioclases with biotite, gneisses and schists. Red soils of Phulbani are formed over kandolite rocks with gneisses and schists. Semiliguda (Koraput) soils are derived from charnockites and kandolites. Lateritic soils of Khurda and Bhubaneswar are derived from Athgarh sand stones. Alluvial soils of Kendrapada are formed on the sediments transported by the branch rivers of Mahanadi. Saline soils of Kespur are derived from Kandolites and basic igneous rocks over which there is deposition of marine sediments from the Chilika lake. The soils of Motto (Bhadak) have been formed by the depositions of rivers from Singhbhum granites and iron ore series. The mixed red and black soils of Aska and Nayagarh have been formed from kandolites and charnockite rocks. The soils of Bhawanipatna and Luisinga (Bolangir) are classified under Vertisols (Ustalfic Pallusterts); the soils of Khurda, Bhubaneswar, Phulbani and Aska under Alfisols (Ferric Plinthustalfs, Ultic Paleustalfs, Aquic Paleustalfs and Psammentic Haplustalfs respectively); the soils of Kendrapara, Motto and Keshpur under Entisols (Typic Ustorthents, Natric Solorthents and Salic Udifluvents respectively) and the soils of Nayagarh under Inceptisols (Vertic Ustochrepts) (Sahu, 1978).

The soils of Semiliguda (Koraput) are classified under Entisols (Typic Ustorthent and Typic Ustifluvent); Inceptisols (Dystric Ustochrept and Typic Haplaquept) and Alfisols (Udic Paleustall) (Ray, 1979).

The soils of Bolani ore mines area (Keonjhar) have been formed on the rocks which are of Mesoproterozoic age and the underlying Singhbhum Bonai granite has the inclusions of iron-ore group rocks. These soils are classified under Alfisols (Kandic Rhodustalfs; Typic Haplustalfs and Kanhaplic Haplustalfs); Inceptisols (Fluventic Ustochrept) and Entisols (Typic Ustorthent and Mollic Ustifluvent) (Das, 1988).

Soils of Muktapur (Khurda) have been formed from coarse sandstones, conglomerates and laterites under upper Gondwana Rock system. The soils of Nayagarh have been formed from gneisses, ferruginous sandstones and shales.
The soils of Muktapur are classified as Lithic Plinthustalfs, Typic Haplustalfs, Typic Eutrochrepts where as the soils of Nayagarh are put under Rhodic Kandustalfs, Lithic Ultic Haplustalfs and Typic Eutrochrepts (Panigrahi, 1991).

The soils of Nedisahi Nala mini-watershed in Khajuriapada block of Phulbani district have been formed on sedimentary material and come under Eastern Ghat hill tract. The soils of the foothills, upper ridges, mid-upland and mid-medium land are classified as Arenic Kanhaplic Haplustalfs and Adidic Kanhaplustalfs, where as the soils of medium valley land are classified as Aridic Ustochrepts (Das, 1994).

The soils of Malipada-Paikarapur watershed in Khajuriapada block of Phulbani district have been formed on lateritic parent material originated from Athagarh sandstone series of rocks belonging to Gondwana rock system. The soils are classified as Kanhaplic Haplustalfs (medium land) and Dystric Eutrochrepts (valley slope land) (Pani, 1994).

The soils of Hirakud command area, which is one of the largest irrigation projects of the country covering parts of the districts of Sambalpur, Bargarh, Bolangir and Sonepur have been derived from Gondwana Shield rock system. The landforms are hill, ridge, valley, levee and stream terraces. Biotite-gneiss is the dominant rock of the area (Mishra, 1981). Besides this the lithology of the area also comprises of alluvium found in the river sides. The soils are classified into four orders-Alfisols (70.8%), Inceptisols (14.0%), Vertisols (9.3%) and Entisols (5.9%). In the sub-order level Ustalfs (60.2%), great-group level Haplustalfs (59.2%) and sub-group level Udic-Haplustalfs (37.2%) are most prevalent. Elluviation, illuviation, leaching and brownification are the predominant pedogenic processes of upland, mid-upland and midlowland soils where as enrichment and gleization are the dominant pedogenic process of lowland soils (Mishra, 1987; Mishra, 2005).

The soils of Ranital (Bhadrak) have been formed from river alluvium and are classified as Typic Haplaquepts and Aeric Haplaquepts (Mishra, 1993; Sahu and Mishra, 1997). The soils of north eastern ghat zone (G. Udayagiri in Phulbani) have been formed from khandolites, sandstones with granite intrusions and come under Eastern Ghat region of Indian Peninsula. Quartz, goethite, olivine and orthoclase are the dominant soil forming minerals. The soils of hill slopes have been classified as Typic Ustifluvents and those of mediumland and foothills as Kandic Palleustalfs, Typic Haplustalfs and Kandic Haplustalfs (Moharana, 1995).

The soils of Bhabanipatna under western undulating agroclimatic zone formed from granite gneiss parent material have been classified as Typic Ustorthents, Aquic Ustorthents, Vertic Haplaquepts and Vertic Endoaquepts (Mallick, 1996).

The soils of Brahmagiri block of Puri district in the north eastern side of Chilika lake under east and south eastern coastal plain agroclimatic zone formed from lacustrine material have been classified as Typic Ustorthents, Aquic Ustorthents, Vertic Haplausepts and Chromic Haplusterts (Parida, 2000).

The soils of central research station, Bhubaneswar developed on laterite parent material have been classified as Arenic, Kandic and Ultic Haplustalfs (Uplands), Fluviatric and Vertic Ustochrepts (Medium lands) and Typic Fluvaquents and Aquic Udort- hents (Low lands) (Nayak, 1998).
A procedure for soil and land irrigability classification suitable for monsoonic humid subtropical region have been developed (Mishra, 1981; Mishra and Nanda, 1984). Three major factors-soil, topography and drainage have been taken into consideration. The factor soil includes nine characteristics (texture, particle size class, coarse fragments, effective soil depth, permeability, salinity, exchangeable sodium percentage (ESP), soil reaction and AWHC); topography includes two characteristics (slope and landshaping) and drainage includes four characteristics (water table, impermeable sub-stratum, submergence due to flood and soil drainage). Depending on the degree of limitations six soil and land irrigability classes have been made—the first four are irrigable; the fifth provisionally non-irrigable and the sixth unsuitable for irrigation.

A procedure for land suitability classification for sisal (Agave sisalana) has been developed (Mishra, 1987; Mishra and Sahu, 1991; Sahu and Mishra, 1994) taking nine characteristics into consideration including five soil characteristics (texture, depth, soil reaction, AWHC and erosion); two topographic characteristics (slope and relief) and two drainage characteristics (water table and soil drainage). According to their suitability for sisal basing on the effects of these nine characteristics, the lands are marked into four classes—suitable, moderately suitable, poorly suitable and unsuitable for sisal.

The fertility capability classification system (FCC) has been adopted for productivity evaluation of rice in the ayacut of Subarnarekha irrigation project (Moharana and Nanda, 1988). The system consists of three categorical levels—types (top soil texture), sub-strata type (sub soil texture) and 15 modifiers. The FCC units list the type and sub-strata type (if present) in capital letters and modifiers in lower case letters, the gravel modifier as prime (,) and the slope in parentheses.

References:


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