

Cartographic blockchain platform solution for sustainable environmental management on the lands of indigenous peoples in the Russian Arctic

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Abstract:

The modern development of the Russian Arctic zone requires solving a set of problems a complex of problems: institutional, socio-economic, environmental, ecological, etc. Nowadays the process of nature management transformation during the ongoing socio-economic development involves the regional indigenous population. The data of modern and promising schemes of nature management in the territories of traditional nature management (TTNU) is necessary to provide their economic development, avoid ethnic-cultural conflicts undermining social stability. Statistical information concerning ecological, ethnological, nature management patterns, cultural issues, etc. is still scattered.

Regarding the mentioned above goal and the Government Resolution, it is obvious that data concerning modern and future nature management patterns at territories of traditional nature use (TTNU) is necessary to provide economic development without ethnic-cultural conflicts undermining social stability. The indigenous population number of the Russian Arctic zone is more than 82 000. Management of TTNU is actual for many Arctic states and is supervised by a special program SDWG of the Arctic Council. Nowadays adequate progress in statistical data accumulation concerns mainly meteorological and climate monitoring data, exploitation characteristics connected with mineral resources extraction, including future projects, the Northern Sea Route exploitation, and infrastructure development, etc. Statistical information concerning ecological, ethnological, nature management patterns, cultural issues are still scattered. There are only a few examples of these information joint presentation, which may be very helpful for Federal and local decision-makers, stakeholders, public organizations, etc. Blockchain methodology may be used to elaborate a distributed register of large data sets, including spatial information, which may be very helpful for decision making by different stakeholders at such territories and reliable accounting of ongoing land-use changes.

This technology enables the creation of a decentralized electronic ledger system that records any transaction of value (for example-ecosystem services in our case), useful for different stakeholders. The goal of this investigation is the elaboration of a concept of a multi-functional cartographic platform based on blockchain principles needed to achieve sustainable development at TTNU in the Russian Arctic involved in the process of nature management transformation during the ongoing socio-economic development of the Russian Arctic zone. Its practical implementation needs more detailed regional information and will promote cooperation among regional stakeholders for the sake of sustainable development.

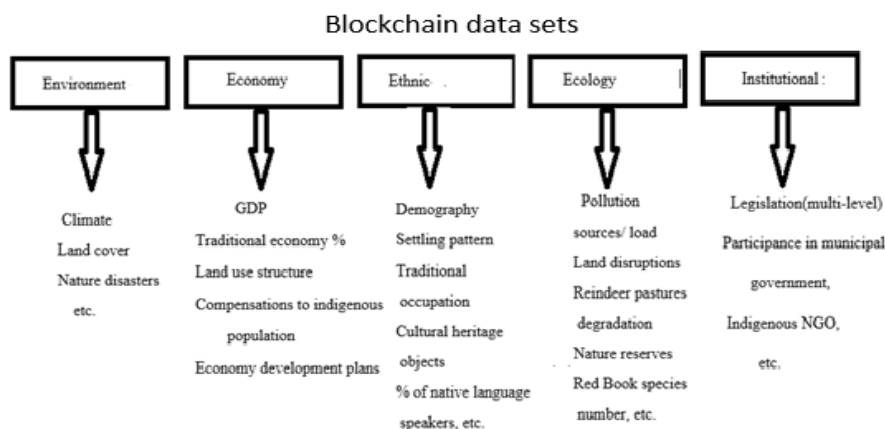


Figure 1. Blockchain structure and data sets (assets).

Spatial-temporal databases for these diverse factors are needed for different independent stakeholders involved in economic activities at indigenous lands. The multi-functional information platform to supply adequate data for practical use will be in demand by Federal and regional authorities (planning, control, etc.), business structures of different levels, indigenous communities, and public organizations, nature conservation groups, etc. It is obvious, that this platform should be multi-level in temporal and spatial dimensions and renewable. The suggested information assets may include statistical, descriptive, and spatial information as well as results of this information-analytical processing. Assets may be used in two ways: data transferring and new data creation, i.e. integration of separate data from assets to create new data helpful for a stakeholder. For example, revealing nature management conflicts is based on the analysis of ecosystem services pools (environment/ecological assets), different ecosystem services consumption by stakeholders (economic assets,) and institutional limitations for their exploitation (institutional assets). The integrated data may be very helpful at the initial planning stage (Evseev, et al., 2019). Blockchain technology provides full traceability of data history and excludes data manipulation. Such transparency creates an opportunity for modern management practice, regarding goals of sustainable development.

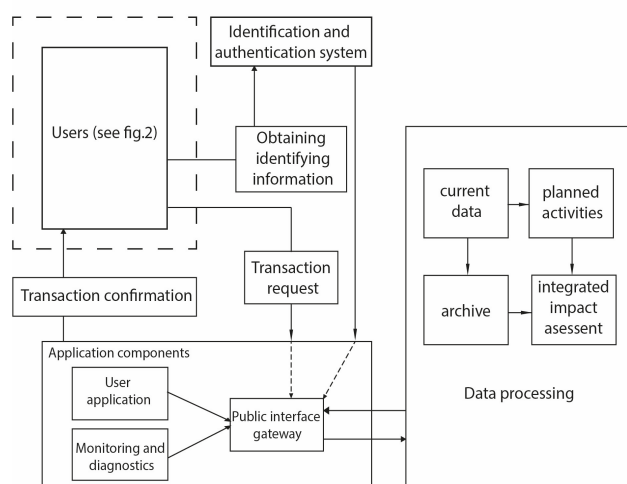


Figure 2. Blockchain transaction model for nature management at TTNU.

The suggested cartographic chain will be public, based on open information sources. This ensures a chance to avoid nature management conflicts following the Federal and regional legislation. Users' number depends on a type of a management project, but by all means, indigenous communes and regional administration will be among them. Application components for working with the system correspond to general blockchain schemes.

Blockchain technology is representative of a new, decentralized, and global electronic infrastructure to meet the challenges of our and future time. Below we outlined the advantages of blockchain approach use in nature management:

- Development of a multi-functional cartographic platform necessary to ensure different stakeholders' interests, indigenous communes being among them.
- Providing data for territorial planning practice contributing to sustainable development.
- Temporal-spatial data assets independent storage and refreshments.
- Monitoring to forecast nature management conflicts (ecological, socio-economic, ethnic, etc.).

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