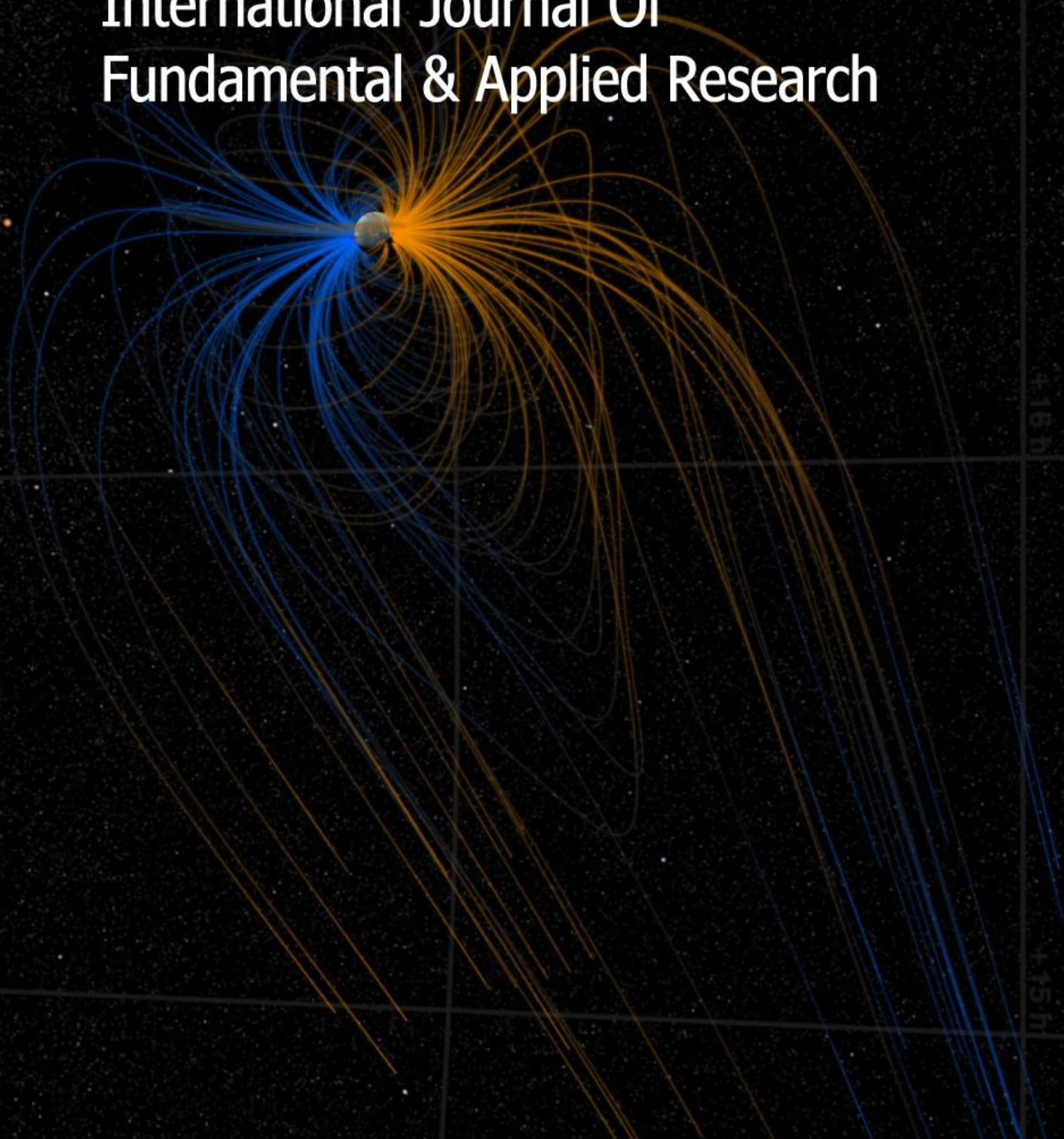


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The Methodology for Optimal Classification of Economies by Development Level of Manufacturing Industry: in Case of European countries

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ABSTRACT

This paper elucidates the methodology for classification of multidimensional observations, and elaborates the development indices of manufacturing industries of the European countries. According to this index the European countries are divided into lower, medium and higher classes. In addition, the paper determines the disposition of the countries to development in the groups classified by development index. The paper ends with the theoretical and empirical conclusions drawn as a result of research.

Keywords: cluster, set, metrics, multidimensional observation, Euclidean distance.

JEL classification: C02, C38, L60.

INTRODUCTION

Classification of multidimensional observations is a complex process which requires a lot of efforts and complex calculations. In turn, a classification is carried out by the use of cluster analysis methods. The main aim of clustering is to form similar groups between the objects and analyze interrelations between them.

The relevance of clustering is specified with the nature of practical problems which it can solve, and with its economically actuality. In our research we elucidate the issues of classification of multidimensional observations, according to which some European countries are divided into lower, medium and higher classes by their “development level of manufacturing industries”. Classifying these countries by certain development level and identifying the regularity is an important issue where every country is characterized with a set of specific indicators. Therefore, it is impossible to classify them by the same level. This, in turn, puts forward the new scientific problems to the issue of classification of

objects, and a special attention is paid to the solution of this issue in the research.

A need for scientific research to the proposed methodology is that there studied not only the issue of classification of objects but also the issue of determining a disposition of objects to development in classified groups

For classification of objects, a parallel clustering method is used in the research. The idea of parallel cluster operations is that in each step of algorithm all the indicators are compared and calculated simultaneously. The main idea to develop different algorithms of parallel classification is to specify the method which provides a rapid solution of the objectives being set and reduces the options of selection.

2. Literature review

Although the first publications on cluster analysis started to emerge in late of 1930s of the last century, however, this method actively developed at

the end of 1960s and beginning of 1970s (Soshnikova, Tamashevich, Uebe and Shefer, 1999). Later on, as a result of development of the information technologies there appeared new methods, modifications and algorithms of clustering, and emerged opportunities to massively process the labor-intensive and large-scale data (Everitt, Landau, Leese, et al., 2011).

A specific aspect of cluster analysis is that it is a common research method for almost all sciences. At present, this method is being widely used in medical science to classify the organisms and determine the hereditary diseases, in chemistry to classify the similar properties of a substance, and in environmental science to classify the changes and processes of the nature (Greenacre and Primicerio, 2013).

As theoretical analyses show that in many scientific sources the hierarchical, parallel and sequence clustering operations have been widely investigated (Rencher, 2002; Manly, 2005).

In scientific literature related to theoretical aspects of our research there have been investigated the issues such as clustering methods and their specific features, problems of interpretation and clustering of the results of cluster analysis (Yegorova and Khachatryan, et al., 2001; Milligan and Cooper, 1987), clustering methods and algorithms, particularly issues of clustering in conditions of uncertainty (Jain, Murty and Flynn, 1996), selection of variables and measuring the distance between objects and the issues of evaluation of a quality of clustering (Qin, 1999), problems emerging with optimal grouping of objects and alternative algorithms serving for overcoming these problems (Vakharia and Mahajan, 2000), hierarchical and nonhierarchical methods of cluster analysis and optimization of a number of clusters (Cornish, 2007), as well as contemporary and classical approaches to cluster analysis, specifically problem statement and

algorithms of cluster analysis in conditions of uncertainty (Řezanková, 2014).

In scientific literature (Špilova, 2015) directly related to practical aspects of our research there have been investigated the issue of classification of European countries by structural changes in industrial production.

Compared to researches mentioned above, our research has two specific aspects. Firstly, in our research we consider not only the issue of classification of objects but the issue of determining their disposition to development in classified groups. Secondly, a classification algorithm enabling “transferring the objects from class to class” is used in our classification issue.

3. Statistical data

The annual reports of the United Nations Industrial Development Organization (Industrial Development Report, 2013 and 2016) serve as the information base of the research.

The statistical data covers the period from 2006 to 2013. Single development indicators of manufacturing industry of 20 European countries are chosen in this research.

4. Methodology

When classifying the countries by development level of manufacturing industry we primarily choose 6 most important economic indicators, and then generate private indicators out of them. These indicators not only characterize the development level of manufacturing industry in the country but also specify the countries' position of economic development on this sector in the world.

4.1. Formulation of private indicators and the options for calculation of generalized indicators

For classification of countries by development level of manufacturing industry, we initially introduce the following indications:

q_i^t - added value of manufacturing industry of i country in t period;

gdp_i^t - GDP of i country in t period;

qe_i^t - export of manufactured industrial products of i country in t period;

te_i^t - total volume of export of i country in t period;

wq^t - added value of the world manufacturing industry in t period;

wqe^t - volume of export of the world manufactured industrial products in t period.

On the basis of initial indications given above we formulate the following private indicators:

$z_{i,1}^t = \frac{q_i^t}{gdp_i^t}$ - share of added value of manufacturing industry in the GDP of i country in t period;

$z_{i,2}^t = \frac{qe_i^t}{te_i^t}$ - share of export of manufactured industrial products in the total volume of export of i country in t period;

$z_{i,3}^t = \frac{q_i^t}{wq^t}$ - share of i country in added value of the world manufacturing industry in t period

$z_{i,4}^t = \frac{qe_i^t}{wqe^t}$ - share of i country in a volume of export of the world manufactured industrial products in t period, $i = 1, 2, \dots, n$

The following vector expressing the development of countries' manufacturing industry in t period is formulated from the private indicators:

$$Z_i^t = (Z_{i,\rho}^t)_{\rho=1,2,3,4}, \quad i = 1, 2, \dots, n. \quad (1)$$

The following matrix is generated from (1) which expresses the development of countries' manufacturing industry and is called "Object-property".

$$Z_i^t = \begin{pmatrix} z_{1,1}^t & z_{1,2}^t & z_{1,3}^t & z_{1,4}^t \\ z_{2,1}^t & z_{2,2}^t & z_{2,3}^t & z_{2,4}^t \\ z_{3,1}^t & z_{3,2}^t & z_{3,3}^t & z_{3,4}^t \\ \cdot & \cdot & \cdot & \cdot \\ z_{n,1}^t & z_{n,2}^t & z_{n,3}^t & z_{n,4}^t \end{pmatrix}, \quad (2)$$

where $z_{i,\rho}^t$ - indicator expressing the development of manufacturing industry of i country in t period, $\rho = 1, 2, 3, 4$.

If Z_i^t matrix is reviewed in $t = 1, 2, \dots, T$ moments then there appeared periodical spatial indicators which include the development of countries' manufacturing industries.

Thus, we divide a set of countries $O = \{O_i, i = 1, 2, \dots, n\}$ into 3 classes $S^u = \{S_1^u, S_2^u, S_3^u\}$ through vectors of periodical spatial indicators $Z_i^t = (Z_{i,\rho}^t)_{\rho=1,2,3,4}, i = 1, 2, \dots, n$ characterizing the development of manufacturing industry of i country in t period. In that case, S_1^u , S_2^u and S_3^u are a set of classes which include the group of countries with respectively "lower", "medium" and "higher" development levels of manufacturing industry.

In this case, the countries belonging to (S_1^u) class are characterized with lower impact of their manufacturing industry on development of the world economy. And the countries belonging to second (S_2^u) and third (S_3^u) classes are characterized with respectively “medium” and “higher” impact on the entire world economy. Also,

$$\begin{aligned} i \neq j \text{ for } S_i \cap S_j &= \emptyset \\ \bigcup_{i=1}^k S_i &= \{i, i = 1, 2, \dots, n\}, \end{aligned} \quad (3)$$

where k - number of classes.

The integral indicator of development of the countries' manufacturing industries should have an aggregate character and be a sum of vector private indicators for the all $i = 1, 2, \dots, n$.

All the private indicators are close or similar to each other in their economic nature and formation. When the possible values for the all i and ρ would change in the single interval $0 < Z_{i,\rho}^t < 1$, then for formulation of generalized indicator a separate measurement of private indicators may be applied.

Thus, for dividing into initial classes we accept the generalized indicator (ω_i^t) expressing the development of manufacturing industry of i country in t period, and consider the order and options for its calculation.

The order and options for calculation of generalized indicators expressing the development of countries' manufacturing industries are as follows:

1. All the private indicators have equal values, i.e. their shares are the same. In this case, the generalized indicator expressing the development of manufacturing industry of i country in t period would be equal to the following:

$$\omega_i^t = \frac{1}{4} \sum_{j=1}^4 z_{i,j}^t, \quad i = 1, 2, \dots, n. \quad (4)$$

2. For the all $Z_{i,j}^t$ private indicators a share of significance λ_i has different values, in that case the generalized indicator would be equal to the following:

$$\omega_i^t = \sum_{j=1}^4 \lambda_i z_{i,j}^t, \quad i = 1, 2, \dots, n. \quad (5)$$

3. If a share of significance of private indicators characterizing the development of country's manufacturing industry is λ_i , and if a share of significance of private indicators characterizing the position of this country on this sector in the world is $1 - \lambda_i$, then an aggregate indicator is calculated as follows:

$$\omega_i^t = \lambda_i \frac{1}{2} (z_{i,1}^t + z_{i,2}^t) + (1 - \lambda_i) \frac{1}{2} (z_{i,3}^t + z_{i,4}^t), \quad i = 1, 2, \dots, n. \quad (6)$$

where selection of λ_i is carried out by the method of expert evaluation.

4.2 Methods of dividing into classes and selection criterion of appropriate metrics

There are plenty of methods of dividing the given set of countries $O = \{O_i, i = 1, 2, \dots, n\}$ into classes, and we introduce a magnitude $Q(S)$ as a selection criterion of the best among them. The magnitude $Q(S)$ is determined by finding a distance $d(Z_i^t, Z_j^t)$ between vector indicators Z_i^t and Z_j^t characterizing the development of manufacturing industries of i and j countries, and $O_i \in O - d(O_i, O_j)$.

There are various dimensions characterizing the distance between signs of objects where we can include Euclidean distance, Mahalanobis metrics, Hamming distance and Canberra metrics.

As the indicators of $Z_{i,\rho}^t, i = 1, 2, \dots, n$ vectors in our process are the same by its economic nature and calculation method, it is reasonable to use ordinary Euclidean distance for measuring the distance given:

$$d_e(Z_i^t, Z_j^t) = \sqrt{\sum_{\rho=1}^4 (z_{i,\rho}^t - z_{j,\rho}^t)^2} \quad (7)$$

If development of manufacturing industry has been implemented with pursuing some specific intents and its position has been formed by expert method, then it is reasonable to use weighted Euclidean distance:

$$d_{be}(Z_i^t, Z_j^t) = \sqrt{\sum_{\rho=1}^4 \lambda_{\rho} (z_{i,\rho}^t - z_{j,\rho}^t)^2} \quad (8)$$

where $0 \leq \lambda_{\rho} \leq 1, \rho = 1, 2, 3, 4$.

After selection of appropriate metrics, we carry out clustering by means of parallel cluster operation. The idea of this cluster operation is that it compares and calculates all indicators simultaneously at each step of algorithm.

To divide the countries into classes by development level of manufacturing industry we use algorithm which enables sequential “transferring the objects from class to class”. As the development indicator $z_{i,\rho}^t$ of a certain country after a definite time can transfer from one development state to another.

As researches show, while dividing the set into classes usually one of the widespread ideas is applied in the algorithms of cluster analysis:

1. Optimizing the division into classes by means of quality functional for initially selected classes.
2. Making clusters on the basis of a principle of detecting the most concentrated positions of indicators in four-dimensional space of the indicators to be considered.

Thus, when dividing a set of countries $O = \{O_i, i = 1, 2, \dots, n\}$ into three classes $S^u = \{S_1^u, S_2^u, S_3^u\}$ in t period it is possible to carry out initial dividing S^0 in 2 options by means of generalized indicator $\{\omega_i^t, i = 1, 2, \dots, n\}$ formulated above (in case of symmetrical and asymmetrical distribution of aggregate indicators).

4.3. Algorithm for initial division when aggregate indicators are symmetrically distributed

First of all, we range the generalized indicators:

$$\omega_{i_1}^t \leq \omega_{i_2}^t \leq \omega_{i_3}^t \leq \dots \leq \omega_{i_n}^t. \quad (9)$$

Later on, we divide the range of all possible changes of the aggregate indicators into 3 intervals:

$$\left[\omega_{i_1}^t, \omega_{i_1}^t + \frac{\omega_{i_n}^t - \omega_{i_1}^t}{3} \right), \left[\omega_{i_1}^t + \frac{\omega_{i_n}^t - \omega_{i_1}^t}{3}, \omega_{i_1}^t + \frac{2}{3}(\omega_{i_n}^t - \omega_{i_1}^t) \right), \left[\omega_{i_1}^t + \frac{2}{3}(\omega_{i_n}^t - \omega_{i_1}^t), \omega_{i_n}^t \right] \quad (10)$$

If $i_l = \max_i \arg \omega_i^t$, then:

$$\omega_{i_l}^t \in \left[\omega_{i_1}^t, \frac{\omega_{i_n}^t - \omega_{i_1}^t}{3} + \omega_{i_1}^t \right), \omega_{i_{l+1}}^t \notin \left[\omega_{i_1}^t, \omega_{i_1}^t + \frac{\omega_{i_n}^t - \omega_{i_1}^t}{3} \right) \quad (11)$$

Hence it appears $S_1^0 = \{i_1, i_2, \dots, i_l\}$.

If $i_q = \max_i \arg \omega_i^t$, then:

$$\omega_{i_q}^t \in \left[\omega_{i_1}^t + \frac{\omega_{i_n}^t - \omega_{i_1}^t}{3}, \omega_{i_1}^t + \frac{2}{3}(\omega_{i_n}^t - \omega_{i_1}^t) \right) \text{ i.e. } \omega_{i_{q+1}}^t \notin \left[\omega_{i_1}^t + \frac{\omega_{i_n}^t - \omega_{i_1}^t}{3}, \omega_{i_1}^t + \frac{2}{3}(\omega_{i_n}^t - \omega_{i_1}^t) \right) \quad (12)$$

Hence it appears $S_2^0 = \{i_{l+1}, \dots, i_q\}$. From formulation above S_3^0 class is determined automatically:
 $S_3^0 = \{i_{q+1}, \dots, i_n\}$

4.4. Algorithm for initial division when aggregate indicators are asymmetrically distributed

This algorithm is based on determining the mode in discrete series $\{\omega_i^t, i = 1, 2, \dots, n\} - \omega_{\text{mod}}^t$. Then, i_l number comes from the following condition:

$$\omega_{i_l}^t \leq \omega_{\text{mod}}^t, \text{ but } \omega_{i_{l+1}}^t > \omega_{\text{mod}}^t \quad (13)$$

then, it appears $S_1^0 = \{i_1, i_2, \dots, i_l\}$, afterwards i_q is determined from the following condition:

$$\omega_{i_q}^t \leq \bar{\omega}^t, \text{ but } \omega_{i_{q+1}}^t > \bar{\omega}^t \quad (14)$$

where $\bar{\omega}^t$ is a mean value for $\omega_i^t, i = 1, 2, \dots, n$.

We have to remind that ω_{mod}^t is value of a sign mostly found in the set, and it expresses the mostly repeatable option in a given option $\{\omega_i^t, i = 1, 2, \dots, n\}$. Also, if we see the discrete series with equal intervals, then ω_{mod}^t intra-modal interval is determined with the following interval:

$$\omega_{\text{mod}}^t = \omega_{\text{mod min}}^t + k \frac{\omega_{\text{mod}}^t - \omega_{\text{mod-1}}^t}{(\omega_{\text{mod}}^t - \omega_{\text{mod-1}}^t) + (\omega_{\text{mod}}^t - \omega_{\text{mod+1}}^t)} \quad (15)$$

where $\omega_{\text{mod min}}^t$ - lower limit of modal interval; k - magnitude of interval; ω_{mod}^t - frequency of modal interval; $\omega_{\text{mod}-1}^t$ - frequency of modal interval relating to previous modal interval; $\omega_{\text{mod}+1}^t$ - frequency of modal interval relating to next modal interval.

Thus, it appears respectively $S_2^0 = \{i_{p+1}, i_{p+2}, \dots, i_q\}$ and $S_3^0 = \{i_{q+1}, i_{q+2}, \dots, i_n\}$. For the types of asymmetrical distribution the empirical density of $f(\omega^t)$ distribution would have the following appearance (Figure 1):

As it is seen from the empirical distribution function, S_1^0 aggregate indicators express the number of countries located in $[\omega_{i_1}^t, \omega_{\text{mod}}^t)$ interval, S_2^0 aggregate indicators express the number of countries located in $[\omega_{\text{mod}}^t, \bar{\omega}^t)$ interval, and S_3^0 aggregate indicators express the number of countries located in $[\bar{\omega}^t, \omega_{i_n}^t]$ interval.

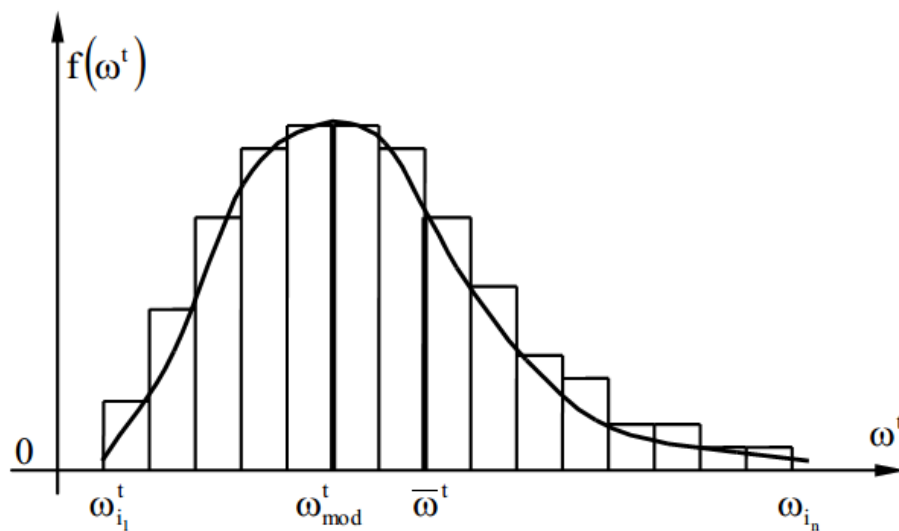


Figure 1. Approximate theoretical view of empiric distribution of the aggregate indicators of development of manufacturing industry

4.5. End of quality criterion and algorithm for dividing into classes

After S^0 initial dividing option is selected, $Q(S^0)$ value of quality criterion for dividing is determined. In the number of classes given, the quality of dividing is composed of a sum of intra-class dispersions:

$$Q(S) = \sum_{k=1}^3 \sum_{i \in S_k^0} d^2(Z_i^t, \bar{Z}_k^t), \quad (16)$$

where $d^2(Z_i^t, \bar{Z}_k^t)$ - squared distance on Euclidean metrics (or weighted Euclidean metrics); S_k^0 - dividing into k classes where a number of classes are strictly constant and it equals to 3 ($k = 1, 2, 3$).

\bar{Z}_k^t - vector of mean values for k class: $\bar{Z}_k^t = (\bar{z}_{k,1}^t, \bar{z}_{k,2}^t, \bar{z}_{k,3}^t, \bar{z}_{k,4}^t)$

$$\bar{z}_{k,\rho}^t = \frac{\sum_{i \in S_k^0} z_{i,\rho}^t}{\dim S_k^0}, \rho = 1, 2, 3, 4., k = 1, 2, 3. \quad (17)$$

$z_{i,\rho}^t$ - components of Z_i^t vector; $\dim S_k^0$ - dimension of S_k^0 set.

Inner sum in $Q(S)$ is taken across the points of i country which correspond respectively to S_1^0 , S_2^0 and S_3^0 classes. Further, every Z_i^t points move across the all clusters by turn, and stand in the position suitable to the best (minimal) value of $Q(S)$ function. When movement of Z_i^t does not result in improvement of quality of division into groups, the algorithm will end (if a sum of values of intra-class dispersion is minimized).

The following condition can be taken as an end condition of algorithm: if $Q(S^m)$ and $Q(S^{m+1})$, m and $m+1$ are the functional values in sequential steps, then $S^m = \{S_1^m, S_2^m, S_3^m\}$, $S^{m+1} = \{S_1^{m+1}, S_2^{m+1}, S_3^{m+1}\}$ are the classes taken in these steps. If the following condition is fulfilled for $\varepsilon > 0$ (ε - clarity of calculation), then the process of dividing into classes stops:

$$|Q(S^m) - Q(S^{m+1})| < \varepsilon \quad (18)$$

As a result of classification carried out we take S^{m+1} division and assign it with S^t . It should be stated that $Q(S)$ sequence is monotone decreasing: created algorithm $Q(S^0) < Q(S^1) < \dots < Q(S^{m+1})$ is used in regard to the identically same set repeatedly; after various divisions $\{Z_i^t, i = 1, 2, \dots, n\}$ and S^0 , finally the best option of $Q(S)$ is generated.

4.6. Formation of sustainable localization zones by development level of manufacturing industry

According to algorithm above, for each t period $i = 1, 2, \dots, n$ a set of countries can be divided into 3 classes $S^t = \{S_1^t, S_2^t, S_3^t\}$ by development level of manufacturing industry.

If we possess an observational statistics ($t_0 - N + 1, t_0 - N + 2, \dots, t_0$ period, where t_0 is a base year) on development level of manufacturing industry in a cross section of countries and economy of countries in N length (N - retrospective length), then proposed algorithm would make it possible to create a group of divisions into classes $O = \{O_i, i = 1, 2, \dots, n\}$ for each t from the retrospective period $\{S^t, t \in [t_0 - N + 1, t_0]\}$.

Using the theoretical operations of set calculation we can generate the following:

$$S_k = \bigcap_{t=t_0-N+1}^{t_0} S_k^t, k = 1, 2, 3 \quad (19)$$

where S_1 - a set of countries whose development of manufacturing industry is characterized with stable lower rates and which maintain such dynamics during the whole retrospective period.

S_2, S_3 - a set of countries whose development of manufacturing industry is characterized with medium and higher rates respectively and which maintain such dynamics during period analyzed. In this case, S_k $k = 1, 2, 3$ can be called as stable zones for various development of manufacturing industry in a cross section of countries.

It is to say that in a set of countries $\tilde{S} = \left\{ i, i \in S / \bigcup_{k=1}^3 S_k \right\}$ the development of manufacturing industry has changeable and unstable dynamics. Therefore, \tilde{S} set can be called as a sphere of unstable development of manufacturing industry in a cross section of countries. These countries “move” from class to class during retrospective period. Movement of each i country $k(i^t) = \arg S_k^t$ can be determined from $i^t \in S_k^t$ condition.

$$K_i^t = \{k(i^t), [t \in t_0 - N + 1, t_0]\}. \quad (20)$$

where K_i determines the sequence of “movements” of i country during retrospective period of ordered set. It is to note that if for the all $[t \in t_0 - N + 1, t_0]$ it appears:

$$K_i^t = \{k(i) = \text{const} = k\} \quad (21)$$

then, the elements of a sequence retain the constant value, and thus, from (19) it appears $i \in S_k$.

4.7. Algorithm for determining the disposition to development in classified groups by development level of manufacturing industries of the European countries

To analyze the “moving” actions of i country across classes within the retrospective period we use (20) relationship. We assign the set with $K_i^t(l)$:

$$K_i^t(l) = \{k(i^t) = l, t \in [t_0 - N + 1, t_0]\}, l = 1, 2, 3. \quad (22)$$

In this case, a number of movements of i country to l class would serve as characteristics expressing the disposition of manufacturing industry of i country to l types of development.

$$N_i(l) = \dim K_i^t(l), l = 1, 2, 3, i = 1, 2, \dots, n. \quad (23)$$

The average time for i country to be in l class would serve as characteristics expressing the disposition of manufacturing industry of i country to l types of development.

$$T_i(l) = \frac{N_i(l)}{N}, l = 1, 2, 3, i = 1, 2, \dots, n. \quad (24)$$

It should be noted that

$$\sum_{l=1}^3 T_i(l) = \frac{1}{N} \sum_{l=1}^3 N_i(l) = 1 \quad (25)$$

This is of significant importance to observe the movement of a set of countries across classes $G \subset S$ and the development of their manufacturing industries. For example, G is a set of countries with sustainable development of manufacturing industry. Belonging to certain groups for these countries is considered with inclusion of their shares. In that case, “moving” of G set across classes during retrospective period can be observed by operations of the following theoretical set.

$$G_1 = G \cap S_1, G_2 = G \cap S_2, G_3 = G \cap S_3,$$

where G_1, G_2, G_3 - small sets of G set where sustainability of development of manufacturing industry is supported.

$$G_4 = G \setminus \bigcup_{k=1}^3 G_k = G \setminus \bigcup_{k=1}^3 (G \cap S_k)$$

In the sets above there observed the unsustainable development of manufacturing industry. The movements of separate countries $i \in G_4$ from class to class can be observed in relationship similar to (20): dynamics and character of movements of $i \in G_4$ countries can be analyzed on the basis of (22) - (25) relationships.

5. Empirical results

The empirical results obtained on the basis of proposed methodology are shown in Table 1. As per analyses, during 2006-2013 Norway is included in the first group (S_1^u) of countries with lower development level of manufacturing industry (Norway's mean value of development index was 8.63 during 2006-2013), and Austria is included in this group with 13.41 value in 2006 and 7.25 value in 2011.

Table 1

Development indices of manufacturing industries of the European countries (in percent)

Country	2006	2008	2011	2013
Austria	13,41	26,83	7,25	27,25
Belgium	26,83	25,41	26,35	25,90
Bulgaria	22,27	21,90	21,24	21,78
Czech Rep.	29,52	29,88	30,36	30,99
Finland	28,91	28,66	27,94	26,83
France	27,16	24,80	26,25	26,02
Germany	32,68	26,97	31,13	31,51
Greece	21,13	21,38	21,75	22,23
Hungary	27,32	26,68	27,53	27,76
Ireland	28,38	27,10	30,22	27,25
Italy	29,37	27,00	28,08	28,24
Netherlands	23,17	21,26	25,74	24,54

Country	2006	2008	2011	2013
Norway	8,54	8,33	8,85	8,78
Poland	26,50	26,63	27,84	27,67
Portugal	25,07	24,45	25,95	26,63
Romania	28,95	26,43	28,29	25,54
Slovakia	28,67	29,60	28,66	29,03
Spain	26,01	24,36	24,65	24,36
Sweden	27,50	26,61	27,03	26,65
Switzerland	28,54	27,28	28,09	27,79

Source: Author's calculations based on Industrial Development Report, 2013 and 2016.

The second group (S_2^u) of countries with medium development level of manufacturing industry included Greece and Bulgaria during 2006-2013 as well as the Netherlands in 2006 and 2008. Particularly, for the Netherlands this index made up 23.17 value in 2006 and 21.26 value in 2008.

As the analyses show that majority of European countries belong to the third group (S_3^u) of countries with higher development level of manufacturing industry.

The disposition of the European countries to development in classified groups by development levels of manufacturing industries is shown in Table 2.

Table 2

Disposition of the European countries to development in classified groups by development level of manufacturing industry (in coefficient)

Country	Groups		
	S_1^u - group	S_2^u - group	S_3^u -group
Austria	0.5	0	0.5
Belgium	0	0	1.0
Bulgaria	0	1.0	0
Czech Rep.	0	0	1.0
Finland	0	0	1.0
France	0	0	1.0
Germany	0	0	1.0
Greece	0	1.0	0
Hungary	0	0	1.0
Ireland	0	0	1.0
Italy	0	0	1.0
Netherlands	0	0.5	0.5
Norway	1.0	0	0
Poland	0	0	1.0

Country	Groups		
	S_1^u - group	S_2^u - group	S_3^u -group
Portugal	0	0	1.0
Romania	0	0	1.0
Slovakia	0	0	1.0
Spain	0	0	1.0
Sweden	0	0	1.0
Switzerland	0	0	1.0

Source: Author's calculations.

As per analyses, during 2006-2013 Norway's manufacturing industry disposes to development with 100 percent probability as well as Austria's manufacturing industry disposes development with 50 percent probability in the first group.

Bulgaria's and Greece's manufacturing industries dispose to development with 100 percent probability as well as the Netherlands' manufacturing industry dispose to development with 50 percent probability in the second group. All the rest of European countries' manufacturing industries dispose to development with 100 percent probability in the third group.

6. Conclusion

1. The empirical results obtained in the course of research enable to work out specific strategy for long-term economic development of manufacturing industry of the countries with various development tendencies, to identify countries with active and weak development level of manufacturing industry and to find out the reasons for it.

2. On the basis of research there worked out the development indices (DI) of manufacturing industries of the European countries according to which this index changes in $0 \leq DI \leq 100$ interval. Approximation of a value of this index to 100 testifies to the effect that manufacturing industries of the countries are being developed.

3. According to empirical results obtained, Norway's manufacturing industry disposes to development with 100 percent probability, Austria's manufacturing industry disposes to development with 50 percent probability in lower level; Bulgaria's and Greece's manufacturing industries dispose to development with 100 percent probability and the Netherlands' manufacturing industry disposes to development with 50 percent probability in medium level; and all the rest of European countries'

manufacturing industries dispose to development with 100 percent probability in higher level.

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वैदिक नीतिशास्त्र में ऋत् की अवधारणा

जयप्रकाश शाक्य

प्राध्यापक दर्शनशास्त्र

शासकीय महाराजा महाविद्यालय छतरपुर (म.प्र.)

सारांश

सम्पूर्ण भारतीय नीतिशास्त्र 'ऋत्' या कर्मवाद के सिद्धान्त को स्वीकार करता है। चार्वाक दर्शन को छोड़कर जैन, बौद्ध आदि अवैदिक परम्परायें भी कर्मफल के सिद्धान्त के आधार पर कर्मानुसार फलभोग के लिए जन्म-मृत्यु के भवचक्र को स्वीकार करती हैं। हिन्दु नीतिशास्त्र वेदों पर आधारित है। अतः वैदिक ऋत् की अवधारणा हिन्दु नीतिशास्त्र स्वीकार करते हैं। ऋत् का शाब्दिक अर्थ घटनाओं का गतिक्रम है। प्राकृतिक और नैतिक घटनाओं का गतिक्रम ऋत् से संचालित होता है। ऋत् का मूल आशय प्रकृति की रूपारूपता तथा वस्तुओं की व्यवस्था से है। ऋत् वह अपरिवर्तनीय नियम है जो संसार के प्रत्येक परिवर्तन की पृष्ठभूमि में कार्यरत है। मनुष्य के श्रेष्ठ आचरण के लिए भी ऋत् के नियम कार्य करते हैं।

प्रस्तावना:-

परिचय- वेद शब्द 'विदसन्तायाम् विदज्ञाने, विद्विचारणे तथा विदल्लामे' इन चार धातुओं से निष्पन्न होता है अर्थात् जिसकी त्रिकाल में सत्ता हो, जो अपूर्व ज्ञानप्रद हो, जो लौकिक और अलौकिक विचारों का कोश हो और लोकोत्तर लाभप्रद हो, ऐसे ग्रंथ को 'वेद' कहते हैं। वेद का अर्थ ज्ञान है— जो परमेश्वर से प्रकट हुआ है। भारत की सनातन मान्यताओं के अनुसार, वेद अपौरुषेय हैं— परमेश्वर ने स्वयं लोकहिताय वेदों की रचना की है। वेद भारतीय संस्कृति के प्राचीनतम ग्रंथ हैं। वेदों की समस्त शिक्षायें सार्वभौम हैं। वेद शब्दमय ब्रह्म का अमूर्त रूप हैं, इसलिए सभी शास्त्रों में वेद शब्द का पर्याय ब्रह्म माना गया है। वेद परमेश्वर का निःश्वास है। मानव का सांसारिक और आयुष्मिक कल्याण के साधन—रूप धर्म का सांगोपांग विश्लेषण वेदों में ही उपलब्ध है। मनीषियों ने वेद को कालातीत, अक्षय ज्ञान का निधान कहा है। मनुष्य जाति के प्राचीनतम इतिहास, सामाजिक नियम, राष्ट्र धर्म, सदाचार, कला, संस्कृति, त्याग, सत्य आदि का ज्ञान प्राप्त करने का एकमात्र साधन वेद ही है। वेद का अन्तिम लक्ष्य मोक्ष—प्राप्ति है। ईश्वरोपासना, योगभ्यास, धर्मानुष्ठान, विद्या—प्राप्ति, सदाचरण, आदि मोक्ष—प्राप्ति के उपाय वेदों में बताये गये हैं। कर्मफल की प्राप्ति के लिए पुनर्जन्म का प्रतिपादन, आत्मोन्नति के लिए संस्कारों का निरूपण, समुचित जीवनयापन के लिए वर्णाश्रम व्यवस्था तथा जीवन की पवित्रता के लिए भक्ष्याभक्ष्य का निर्णय करना आदि

वेदों की मुख्य विशेषता है। वेद चार हैं — ऋग्वेद, यजुर्वेद, सामवेद और अथर्ववेद। ऋग्वेद में स्तुति, यजुर्वेद में यज्ञ, सामवेद में संगीत तथा अथर्ववेद में आयुर्वेद, अर्थशास्त्र, राष्ट्रीय संगठन तथा देश—प्रेम प्रतिपाद्य विषय है। वेद में एक लाख मंत्र हैं। 80 हजार मंत्र केवल कर्मकाण्ड का निरूपण करते हैं। 16 हजार ज्ञानकाण्ड का तथा 4 हजार मंत्र उपासना काण्ड के हैं। ऋग्वेद के अध्ययन की परम्परा पैलऋषि से प्रारम्भ हुई। ऋग्वेद में 64 अध्याय, 8 अष्टक, 10 मण्डल, 2006 वर्ग, 1000 सूक्त, 85 अनुवाक तथा 10,440 मंत्र हैं। ऋक्संहिता की 21 शाखाएँ हैं। इसके दो भेद हैं — शुक्ल यजुर्वेद और कृष्ण यजुर्वेद। शुक्ल यजुर्वेद की 15 संहिताएँ हैं। इनमें वाजसनेयी और काण्व, दो संहिताएँ उपलब्ध हैं। कृष्ण यजुर्वेद की 86 संहिताएँ हैं, इनमें चार तैत्तरीय, मैत्रायण, कठ और कपिष्ठल संहिताएँ उपलब्ध हैं। सामवेद की 1000 संहिताएँ हैं, जिनमें कौथुल और जैमिनी दो शाखाएँ उपलब्ध हैं। राणायनीय की गोवर्धन पद्धति काशी में देखी जा सकती है। अथर्ववेद की 9 शाखाएँ हैं, जिनमें शौनक और पैप्लाद दो शाखाएँ उपलब्ध हैं। अथर्ववेद को अथर्वगरोवेद, ब्रह्मवेद, भिषग्वेद तथा क्षेत्रवेद के नाम से भी जाना जाता है। अथर्ववेद में 20 काण्ड, 730 सूक्त, 36 प्रपाठक और 5987 मंत्र हैं।

वेद अपौरुषेय हैं। प्राचीन काल से ऋषि, महर्षि, आचार्य तथा भारतीय संस्कृति में आस्था रखने वाले विद्वानों ने वेद को सनातन, नित्य और अपौरुषेय माना है। उनकी यह मान्यता है कि वेद का प्रादुर्भाव ईश्वरीय ज्ञान के रूप में

हुआ है, जिस प्रकार ईश्वर अनादि, अनन्त और अविनश्वर है। इसीलिए उपनिषदों में वेद को ईश्वर का निःश्वास कहा गया है। वेदों के महान् भाष्यकार श्री सायणाचार्य ने अपने 'वेदभाष्य' में लिखा है –

“यस्य निःश्वसितं वेदा यो वेदेभ्याऽखिलं जगत् ।
निर्ममे तमहं वन्दे विद्यातीर्थ महेश्वरम् ।।”

अर्थात् वेद ईश्वर का निःश्वास है, अतः परमेश्वर द्वारा निर्मित है। वेद से ही समस्त जगत् का निर्माण हुआ है। इसलिए वेदों को अपौरुषेय कहा जाता है कि मनु ने वेद को सनातन ब्रह्म कहा है। तैत्तिरीय आरण्यक में कहा गया है कि “ब्रह्मस्वयंभू हैं, अतः उससे निसृत वेद अपौरुषेय हैं।”¹ महर्षि व्यास देव ने लिखा है – “वेदों नारायण साक्षात्”² तथा “वेदों नारायण साक्षात् स्वयम्भूरिति शुश्रुम्”³ अर्थात् वेद साक्षात् नारायण हैं, वे स्वयंभू हैं। अतः वेद अपौरुषेय हैं।

‘महाभारत’ के ‘शांति पर्व’ में कहा गया है – “अनादिनिधना विद्या वासुत्सृष्टा स्वयम्भुवा ।” अर्थात् जिससे सम्पूर्ण जगत् उत्पन्न हुआ, ऐसी अनादि वेद विद्यारूप दिव्य-वाणी का निर्माण जगत्-सृष्टि ने सर्वप्रथम किया। वेद मन्त्रों का साक्षात्कार होने पर साक्षात्कारी को ऋषि कहा जाता है – “ऋषि दर्शनात्”। इस प्रकार सपष्ट है कि वेद का कर्तृत्व अन्य किसी के पास न होने से ईश्वर प्रणीत हैं, अतः वेद अपौरुषेय हैं।

‘वृहदारण्यकोपनिषद्’ की श्रुति है— “अस्य महतो भूतस्य निःश्वसितमेतद्यद्वेदो यजुर्वेदः सामवेदोऽथर्वाङ्गिरसः ।”⁴ अर्थात् सृष्टिकर्ता ने सृष्टि के प्रारम्भ में सृष्टि की सुव्यवस्था के लिए धर्म-बोध की आवश्यकता समझी और उसके लिए उन्होंने प्रथमतः ब्रह्मा को ऋग्वेद, यजुर्वेद, सामवेद और अथर्ववेद धारण कराया।

‘मीमांसा’ भाष्यकार शबर स्वामी के अनुसार। “चोदना हि भूतं भवन्तं भविष्यतं सूक्ष्मं व्यवहितं विप्रकृष्टमित्मेव जातीयकमर्थं शक्रोत्यवगमयितुम्” अर्थात् वेदों की अपूर्वता अथवा असाधारण शक्ति यह कि उनसे भूत, वर्तमान, भविष्य में घटने वाले अर्थ ही नहीं, सूक्ष्म व्यवहित तथा अन्य अर्थ भी ज्ञात होते हैं। ऐसी दिव्यता और असाधारण शक्ति कहीं भी दृष्टव्य नहीं है, निश्चित ही वेद अपौरुषेय हैं।

सुप्रसिद्ध वेदभाष्यकार सायणाचार्य का मत है कि “स्वयंप्रकाश सूर्य जिस प्रकार दुर्गम विषयों का भी बोध करा सकता है, उसी प्रकार वेद भी अचिन्त्य और अद्भुत, विस्मयकारी शक्ति से युक्त है। घटपाटदि में स्वयं प्रकाश की शक्ति नहीं है, जबकि सूर्य एवं चन्द्रमा में ऐसी शक्ति है। मनुष्यादि में स्वस्कन्धारोहण की शक्ति नहीं है, जबकि पेद, जो अकुण्ठित सामर्थ्य से युक्त हैं, इतरवस्तु-प्रतिपादकत्व शक्ति के समान स्वप्रतिपादकत्व शक्ति से युक्त होते हैं,

इसलिए सम्प्रदायविद वेद की अकुण्ठित शक्ति का दर्शन कराते हैं, अतः वेद अपौरुषेय हैं।

शंकराचार्य का मत है – “वेदस्य हि धर्माधर्मयोः निरपेक्षं प्रामाण्यंरवेरिव रूपं विषये ।” निरपेक्ष प्रमाण कहने का तात्पर्य यह है कि यहाँ किसी अन्य प्रमाण की आवश्यकता नहीं है अर्थात् अपौरुषेय वेद के लिए प्रमाण हैं।

भारतीय दर्शन यह मानता है कि शब्द नित्य है, उनका अनुक्रम नित्य है, उनकी उच्चारण पद्धति नित्य है, इसलिए वेद के अर्थ नित्य हैं। ऐसी वेद-वाणी का निर्माण स्वयं परमेश्वर ने किया है, अतः वेद अपौरुषेय हैं। श्रीमद्भागवत् (10/4/41) के अनुसार –

“विप्रागावश्च वेदाश्च तपः, सत्यं दमः शमः ।

श्रद्धा दया तितिक्षा च कृतवश्च हरेस्तनूः ।।”⁵

अर्थात् वेदज्ञ ब्राह्मण, दुधारुगाय, वेद, तप, सत्य, दम, शम, श्रद्धा, दया, सहनशीलता और यज्ञ-ये श्रीहरि परमेश्वर के स्वरूप हैं। अतः वेद अपौरुषेय हैं।

वेदों में ऋत् की अवधारणा— वैदिक दर्शन में ऋत् की अवधारणा एक महत्वपूर्ण अवधारणा है। ऋत् का अर्थ नैतिक व्यवस्था है, जो प्राकृतिक नियमों पर आधारित है। परमेश्वर ने सृष्टि के आदिकाल में सृष्टि के संचालन के लिए ऋत् की व्यवस्था दी, जो वैदिक ऋषियों के लिए नैतिक जीवन और प्रकृति पर आधारित जीवन में सहायक हुई। ऋषियों ने परमात्मा से प्रार्थना की, कि “न ऋते त्वम् क्रियते” अर्थात् आपके बिना ऋत् अर्थात् प्राकृतिक व्यवस्था नहीं हो सकती है। ऋत् की अवधारणा को हम निम्न रूपों में समझ सकते हैं।

ऋत् प्रकृति निधान का नियम है – ऋत् का अर्थ प्राकृतिक घटनाओं का गतिक्रम है। प्रकृति की अनियमितता एवं संतुलन से सम्पूर्ण सृष्टि संचालित है। दिन-रात ऋतु-परिवर्तन, सूर्य-चन्द्र तारों की नियमित गति, सब कुछ निश्चित है, जो प्रकृति विधान की ओर संकेत करता है। इस नियमित गति का नियन्ता कोई न कोई अवश्य है। विश्व की गतिमान गतिविधियाँ वस्तुतः ऋत् की ही अभिव्यक्तियाँ हैं। विश्व व्यवस्था के पीछे ऋत् का ही सिद्धान्त है। पवन सुदूर ऋत् के स्थान से आती है। आकाश, पृथ्वी, जल, वायु और अग्नि, सभी ऋत् से ही संधारित हैं। वेदों के अनुसार सम्पूर्ण चर-अचर जगत् ऋत् के सिद्धान्त से ही संचालित है।

ऋत् नैतिक विधान का नियम है – वेदों की मान्यता है कि विश्व की समस्त गति, व्यवस्था और परिवर्तन के मूल में अपरिवर्तनीय और गतिरहित ऋत् समस्त गति, व्यवस्था और परिवर्तन के मूल में अपरिवर्तनीय और गतिरहित ऋत् का नियम है। विश्व-व्यवस्था ही कालान्तर में नैतिक विधान के रूप में परिवर्तित हो गई। ऋत् वह नैतिक ग्रंथ है जिसका न केवल मनुष्यों को अनुसरण करना है बल्कि ऋत् वह न्याय

का मार्ग है, जिस पर देवताओं को भी चलना है। ऊषा ऋत् मार्ग का अनुसरण करती है, सही मार्ग पर चलती है। वह अपने क्षेत्र का कभी अतिक्रमण नहीं करती है। सूर्य, चन्द्रमा और तारे भी ऋत् के अनुसार ही चलते हैं। समस्त विश्व का अधिष्ठान ऋत् है। इस प्रकार जहाँ एक ओर ऋत् प्रकृति के विधान की ओर संकेत करती है, वहीं दूसरी ओर वह नैतिक विधान की भी प्रतिपादक है।

ऋत् के नैतिक विधान के लिए देवताओं से प्रार्थनाएँ— मानव—जीवन सुखी एवं कल्याणकारी हो, इसके लिए वैदिक ऋषियों ने देवताओं से अनेक प्रार्थनाएँ की हैं— “अग्ने नय सुपथा राये अस्मा विश्वानि देव वयुनानि विद्वानि।” (यज.40/16) अर्थात् हे प्रभु! हमें सुपथ पर ले चलो, हमें सदैव कल्याणकारी पथ प्राप्त को, हमारे पापों को नष्ट कर दो। “भद्रं—भद्रं क्रतुमस्मा सु धेहि।”⁶ अर्थात् हे परमेश्वर! हम लोगों में सुख और कल्याणमय उत्तम संकल्प, ज्ञान और कर्म धारण कराओ। “भद्रं कर्णेभिः शृणुयाम्”⁷ अर्थात् हम कानों से भद्र कल्याणकारी वचन ही सुनें। “मित्र चक्षुषा समीक्षाम हे”⁸ अर्थात् हम सब परस्पर मित्र की दृष्टि से देखें। “ऋतस्य पथा प्रेत”⁹ अर्थात् हे प्रभो! हमें सत्य के मार्ग पर ले चलो। “यदा न शर्म सप्रथमः”¹⁰ अर्थात् हे भगवान्! आप हमें अनन्त अखण्ड एकरस परिपूर्ण सुखों को प्रदान करें। “भद्रं नो अपि वातय मनोदक्षमृत ऋतम्”¹¹ अर्थात् हे परमेश्वर! आप हम सबको कल्याणकारक मन, कल्याणकारक बल और कल्याणकारक कर्म प्रदान करें। “वयं स्वाम समतौ”¹² अर्थात् हमें सद्बुद्धि प्रदान करो।

इस प्रकार ऋत् देवताओं को पथ पर चलाने वाला तथा ऋत् को जानने वाला मानकर वैदिक ऋषियों ने ईश्वर से अनेक प्रार्थनाएँ की देवताओं को ‘ऋतज्ञा’¹³ तथा “ऋतावान ऋतजाता ऋतवृधो घोरासो अनृतद्विषः”¹⁴ आदि विभिन्न मंत्रों को ऋत् का अधिष्टता माना गया तथा मनुष्यों के लिए ऋत् मार्ग पर चलने की प्रार्थनाएँ अनेक स्थलों पर अनेक संदर्भों में की गई है।

ऋत् सदाचार का मार्ग है – वैदिक दर्शन में यह स्वीकार किया गया है कि ऋत् का सिद्धान्त मनुष्य को सदाचार के पथ पर ले जाने वाला मार्ग है। इसीलिए वैदिक ऋषियों ने सदाचार हेतु प्रार्थनाएँ की “ह पीरि माग्ने दुष्परिताद्वाधस्वा मा सुचरिते भज” अर्थात् हे अग्निदेव आप हमें पापों से पूर्णतः बचाएँ। आप सदाचार रूपी व्यक्तित्व को हम यजमानों में प्रतिष्ठित करें।

“प्रतिपन्थामयस्वस्तिगामनेहसम्”¹⁵ अर्थात् गमन करने योग्य पाप या अपराध रूपी बाधाओं से रहित मार्ग हमें प्राप्त हो। वेदों में कहा गया है— “ऋतस्य पन्था न तरन्ति दृष्टतः” अर्थात् दुराचारी सत्य के मार्ग को पार नहीं कर सकते हैं। सदाचारी ही सत्य के पथ को अनुगामी है और जो भी सत्य के पथ पर चलता है वह उसे पार कर ही जायेगा।

“ऋतस्य मा प्रदिशो वर्धयन्ति।”¹⁶ ऋत् के आदेश सदाचार के संकेत प्रभु का संवर्धन करने वाले हैं। “स्वर्गः पन्था सुकृते देवयानः” स्वर्ग या ज्योति की ओर ले जाने वाला देवयान पथ सुकृति सदाचारी के भाग्य की वस्तु है। ऋषि प्रार्थना करते हैं कि हे देव! हमें दुष्परित से पृथक करें और सब ओर से सदाचारी का भागी बनायें। हम अमर दवों का अनुसरण करें तथा उत्तम आयु और शोभन जीवन लेकर ऊपर उठ जाएँ। सदाचार ही व्यक्ति को ऊपर उठाता है। दुराचार तो नीचे गिराने वाला एवं हम आयु को क्षीण करने वाला तथा रोगों का केन्द्र बनाने वाला होता है। सदाचार से निरोगता प्राप्त होती है।

स्वस्ति पथ ही सदाचार का पथ है— वेदों में कहा गया है कि स्वस्ति पथ ही सदाचार का पथ है। आचार्य सायण ने स्वस्ति शब्द का अर्थ “अविनाशी मंगलम्” अर्थात् शाश्वत कल्याण बताया है। इस प्रकार स्वस्ति पथ सदाचार और शाश्वत कल्याण का पथ है। ऋग्वेद (5/51/15) में कहा गया है— “स्वस्ति पन्थामनु चरेम्” अर्थात् हम अविनाशी और कल्याणप्रद मार्ग पर चलें। “मा प्र गाम पथो वयं मा यज्ञादिन्द्र सोमिनः। मान्तः स्थनों अरायतेः।”¹⁷ अर्थात् हम सत्पथ छोड़कर कभी न चलें। वैभवयुक्त होकर त्याग को न त्यागें। हमारे अन्दर शत्रुता न रहे। हमारे कृत सुकृत में प्रवृत्त हों। “भद्रं मनः कृणुष्व।”¹⁸ अर्थात् हे प्रभो! हमारे मन को कल्याणकारी कार्यों की ओर प्रेरित करें। “युयोध्यस्मज्जुहुराणमेनः।” अर्थात् कुटिलता के पाप पथ से हमें दूर रखें। “सुगः कर्तसुपथा स्वस्तये।” अर्थात् सुपथ को प्रभु हमारे लिए सुगम कर दें जिससे हम कल्याण के भाजन बन सकें।

ऋषि कहते हैं कि यदि “न नः पश्चात् अद्यं नशत्।” अर्थात् पाप हमारे पीछे न पड़े तो “भद्रं भवति न पुरः।” अर्थात् भद्र निश्चित रूप से हमारे सामने आ जायेगा। “विश्रानि देव सावितर्दुरितानि परासुव। यद्भद्रं तन्न आसुव।” अर्थात् हे प्रभो हमारे दुरित दुराचार दूर हों जो भद्र हैं, कल्याणकारी हैं, मंगलमय हैं, वे ही हमें प्राप्त हों। दुराचार या कुत्सित आचरण हमारे विनाश का कारण हैं, जबकि सदाचार हमें प्रतिष्ठित करते हैं। “स नः पूषाड बिना भुवत्”। अर्थात् सदाचार हमें पोषण देता है तथा हमारी रक्षा करता है।

ऋत् सत् और श्रुत्— वेदों के अनुसार ऋत् सदाचार है। वेदों में ‘ऋत्’ और ‘सत्’ का युग्म है। ऋत् का संबंध चर और चित् से है। सत् का संबंध अचर और अचित् से है। इस आधार पर सत्य वे नियम जो विश्व की सत्तात्मक स्थिति से संबंध रखते हैं और ऋत् वे नियम जो जो उसकी गत्यात्मक और क्रियात्मक स्थिति से संबंध रखते हैं। यही दो नियम विश्व की चराचर जड़ जंगम अथवा चित्—अचित् स्थितियों का नियंत्रण करते हैं। वेदों में ऋत् या सदाचार

का नियम महत्वपूर्ण नियम है। वेद मानते हैं कि सदाचार रूपी वृक्ष पर ही आनन्द का फल लगता है।

सदाचार में सत् है और श्रद्धा में श्रुत है। सत् और श्रुत प्रायः एक ही है और धारण करना धर्म है। ऐसे धर्मों के अध्यक्ष “अध्यक्षमार्गाम् अग्निदेव” है, सर्वाग्रही, परमेश्वर हैं वही सत् और श्रुत का निधान है। उसी की प्राप्ति धर्म की प्राप्ति है। सत् और श्रुत की उपलिब्ध सदाचार से ही संभव है।

ऋत् कल्याणकारी मार्ग है – वेदों के अनुसार ऋत् का मार्ग लोककल्याणकारी मार्ग है। इसीलिए ऋषि प्रार्थना करते हैं कि – “सर्वमेव शमन्तु नः”¹⁹ अर्थात् हमारे लिए सब कुछ कल्याणकारी हो। ऋग्वेद में कहा गया है—

“शं न इन्द्राग्नी भवतामवोभिः शं न इन्द्रावरुणा रातहव्या ।
शमिन्द्रासोमा सुविनाय शं यो शं न इन्द्रापूर्णा वाजसातो ।।”²⁰

अर्थात् दिन और रात्रि हम सब के लिए मंगलकारी हों, इन्द्र और अग्नि देव, इन्द्र और वरुण देव हम सभी का कल्याण करें। इन्द्र और पूषा देव मंगलकारी अन्न और ऐश्वर्य प्रदान करें। इन्द्र और सोमदेव सुसन्तति प्राप्त करने के लिए तथा रोगों के शमन और भय को दूर करने के लिए हमारे लिए मंगलकारी हो।

“शं नो भगः शमु नः शंसो अस्तु शम नः पुरन्धिः शमु सन्तु रायः ।

शं नः सत्यस्य सुयमस्य शंसः शं नो अर्यमा पुरुजातो अस्तु” ।।²¹(ऋत् 7 / 35 / 2)

अर्थात् भग देवता हमें परम शान्ति प्रदान करें। यह शान्ति मनुष्यों द्वारा प्रशंसित हो। बुद्धि और धन हमें शान्ति प्रदान करें। श्रेष्ठ एवं शिष्ट बोले गये वचन हमें शान्ति देने वाले हों। अर्थात् हमें शान्ति देने वाले हों।

ऋषि प्रार्थना करते हैं कि “द्याता, धर्ता, द्यावा पृथ्वी का अन्न, पर्वत, देवताओं की उपासना ये सब हम सबके लिए शान्तिदायक और कल्याणकारी हों। तेजस्वी अग्नि देव, मित्र-वरुण देव, सूर्य देव दोनों अश्विनीकुमार, सत्कर्मा, और गमनशील वायुदेव हमें शान्ति प्रदान करें। द्याता-पृथ्वी हमें प्रथम बार प्रार्थना में शान्ति प्रदान करें। श्रेष्ठ दर्शन के निमित्त अन्तरिक्ष हमें शान्ति प्रदान करें। वनस्पति एवं औषधियाँ हमें शान्ति प्रदान करें। विजयशील लोकपाल भी हमें शान्ति प्रदान करें। इन्द्र देवता वसु गुणों के सहित, आदित्यों के सहित वरुण देव, रुद्र गुणों के सहित जल देव हमें शान्ति प्रदान करें। त्वष्टा देव देव पत्नियों के सहित हमें शान्ति प्रदान करें सभी देवगण हमारी विनय सुनें। सोम एवं ग्रावा हमें शान्ति दें। ब्रह्मदेव एवं यज्ञदेव हमें शान्ति दें। यूपों का प्रमाण, औषधियाँ, वेदिका, आदि हमें शान्ति प्रदान करें। अदिति, मरुद्गण, विष्णुदेव, पूषादेव, अन्तरिक्ष एवं वायुदेव हमें शान्ति

प्रदान करें। त्राण प्रदाता सवितादेव, तेजस्वी ऊषाएँ, पर्जन्य एवं क्षेत्रों के कल्याणकारी अधिपति हमें शान्ति प्रदान करें। समस्त देवगण, बुद्धिदात्री सरस्वती, यज्ञकर्ता, दानकर्ता, द्युलोक, पृथ्वी और जल के देवगण हमें शान्ति प्रदान करें। ऋषि कहते हैं—

“ये देवानां यज्ञिया यज्ञियानां मनोर्यजत्रा अमृता ऋतज्ञा
ते नो रासन्तामुरुगायमद्य यूये पात स्वतिभिः सदा न ।।”²³

अर्थात् यजनीय देवताओं के लिए भी जो पुण्य हैं, मनुष्यों के लिए भी जो पूज्य है, मनुष्यों के लिए भी जो पूज्य हैं, ऐसे अमर कृतज्ञदेव आज प्रसन्न होकर हमें पुत्र दें तथा हमारा पालन और कल्याण करें।

इस प्रकार वैदिक ऋषियों ने ऋत् को शान्ति और कल्याणकारी मार्ग मानते हुए विभिन्न देवी-देवताओं की स्तुतियाँ की हैं। वस्तुतः ऋत् का गृह यज्ञशाला माना गया है, जहाँ समस्त देवगणों का मानवकल्याण के लिए आह्वान किया जाता है। इसलिए ऋषि कहते हैं कि “हे जगदीश्वर! आपकी कृपा से चन्द्रमा हम दोनों के लिए सुखरूप हो, धन व अन्य हमारे लिए सुखरूप हो, मेघ, यज्ञ, औषधि आदि सभी हमारे लिए सुखरूप हों ।।”

मित्र और वरुण ऋत् के संरक्षक हैं— “ऋतं च सत्यं चाभीद्वान्त तपसोऽध्यजायत”²⁴ अर्थात् सर्वत्र प्रकाशवान् परमेश्वर के तप से ऋत् और सत्य उत्पन्न हुए। ऋग्वेद के सप्तम सूक्त में 15 मंत्र हैं, जिनमें मैत्रा वरुणि वशिष्ठ द्वारा अग्निदेव से शुद्ध बुद्धि की कामना, वाणी में परिष्कार, योगक्षेम, सुख शान्ति और दीर्घ आयु की प्रार्थनाएँ की गई हैं। वैसे तो पृथ्वी, अन्तरिक्ष और जल के सभी देवताओं से प्रार्थना की गई है, फिर भी मित्र और वरुण को ऋत् का संरक्षक माना गया है। दोनों देवता ही सत्य की प्रतिष्ठा करते हैं। ये दोनों ही नैतिक और भौतिक नियमों के संचालक हैं। ये सुष्टि का सतत् अवलोकन करते हैं। इन्हीं के कारण दिन और रात के नियम स्थिर हैं। ये दोनों देवता न केवल प्राकृतिक व्यवस्था के रूप में इसके संरक्षक हैं, बल्कि नैतिक नियम के रूप में इसके पोषक भी हैं। वे पुण्यात्माओं के मित्र और दुष्ट आत्माओं के शत्रु हैं। इसलिए मनुष्य को दुराचार का मार्ग छोड़कर सदाचार का मार्ग अपनाना चाहिए तथा देवों के क्रोध से बचकर उनका आशीर्वाद प्राप्त करना चाहिए।

ऋत् कर्मफल का व्यवस्थापक है— वैदिक नीतिशास्त्र यह मानता है कि ऋत् कर्मफल का व्यवस्थापक है। वैदिक प्राकृतिक एवं नैतिक नियम ही कर्मफल सिद्धान्त के रूप में फलित हुआ। अच्छे कर्मों का अच्छा परिणाम और बुरे कर्मों का बुरा परिणाम मिलता है। मनुष्य को सदैव सत्कर्म करने चाहिए। ऋषि प्रार्थना करते हैं कि— “निर्दुर्भव्य ऊर्जा मधुमती वाक्”²⁵ अर्थात् हमारी शक्तिशाली मीठी वाणी कभी भी दुष्ट स्वभाव वाली न हो। “मा नो द्विक्षत कश्चन्”²⁶ अर्थात् हमसे

कोई शत्रुता करने वाला न हो। वेदों का प्रतिपाद्य विषय यह है कि वे मानव मात्र का मार्गदर्शन करते हैं कि मनुष्य को जन्म से लेकर मृत्युपर्यन्त तक प्रतिक्षण क्या करना चाहिए और क्या नहीं करना चाहिए? साथ ही प्रातः जागरण से लेकर रात्रि शयन तक सम्पूर्ण चर्या और क्रिया-कलाप क्या होना चाहिए। अथर्ववेद में कहा गया है कि पूर्वजन्म के अच्छे-बुरे कर्मों के अनुसार ही जीवात्मा नवीन योनियों में शरीर धारण करता है। अथर्ववेद के अनुसार—
“आ यो धर्माणि प्रथमः ससाद ततो वपूषि कृणुषे पुरुणि।
धास्युयो निं प्रथम आ विवेशा यो दाचमनुदितां चिकेत।।”²⁷

ऋषि कहते हैं कि पूर्वजन्म कृत पाप-पुण्य का भोगी जीवात्मा है और वह पिछले जन्म में जो पाप-पुण्य किये रहता है, उसी के अनुसार अच्छा-बुरा शरीर धारण करता है। अधर्माचरण करने वाला पशु आदि योनियों में भी जन्म लेता है। संक्षेप में ऋत् कर्मफल का व्यवस्थापक है। ऋत् हमारे कर्मानुसार कर्मफल की व्यवस्था देकर पुनर्जन्म तक की व्यवस्था देता है। यह सिद्धान्त मानता है कि जो व्यक्ति इसी लोक के भोगों में डूबा रहता है, उसका बार-बार जन्म होता है, किन्तु जो आत्मा को नित्य समझकर, परलोक का ध्यान रखकर सत्कर्म करता है, वह जन्म-मृत्यु के बन्धन से छूट जाता है।

ऋत् सत्य मार्ग का प्रतिपादक है— वेदों के अनुसार ऋत् सत्य मार्ग का प्रतिपादक है। अथर्ववेद का कथन है कि— सत्य ऋत्, दीक्षा, तप, अनुशासन, ब्रह्म और यज्ञ ये सब पृथ्वी को रोके हुए हैं— “सत्यं वृद्धतमुग्रं दीक्षा तपो ब्रह्म यज्ञः पृथ्वी धारायन्ति।”²⁸ अर्थात् सत्य से भूमि रुकी हुई है— “सत्येनोत्तमिता भूमिः।” “ऋतेनादित्यास्तिष्ठम्।”²⁹ अर्थात् कृत् सूर्य प्रतिष्ठित है। हमें असत्य को छोड़कर सत्य का मार्ग अपनाना चाहिए। सत्य से जीवन में जागृति आती है। सत्य वचन मनुष्य की सब ओर से रक्षा करता है। ऋत् जो प्राकृतिक और नैतिक नियमों की देवताओं और मनुष्यों के लिए व्यवस्था देता है, वह सत्य मार्ग ही है। अस्तु ऋत् सत्य मार्ग का प्रतिपादक है।

ऋत् अपूर्व और अदृष्ट का नियामक है— वेदों के अनुसार अपूर्व और अदृष्ट का नियामक भी ऋत् है। सम्पूर्ण विश्व में अलंघ्य नैतिक व्यवस्था है। यही विश्व की श्रृंखला और धर्म का आधार है। वेदों में इसे ऋत् तथा मीमांसा में इसे अपूर्व कहा गया है। वर्तमान कर्मों का उपभोग परवर्ती जीवन में अपूर्व के द्वारा किया जा सकता है। न्याय वैशेषिक दर्शन में इसे अदृष्ट कहा गया है। क्योंकि यह दृष्टिगोचर नहीं होता है। यही व्यवस्था कर्मवाद भी कहलाती है। किये हुए कर्मों का फल भोगना पड़ता है। और बिना किये हुए कर्मों का फल नहीं मिलता है।

अर्थात् “कृतप्रणाश” और ‘अकृताभ्युपगम’ नहीं होता है। ऋत् का सिद्धान्त कर्मफल का जन्मदाता है। प्रत्येक व्यक्ति कर्म करने के लिए स्वतंत्र है, किन्तु उसे कर्मानुसार फल तो भोगना ही पड़ता है।

निष्कर्ष — उपर्युक्त संक्षिप्त विवरण से यह स्पष्ट है कि ‘ऋत्’ की अवधारणा वेदों की मौलिक और महत्वपूर्ण अवधारणा है। वेदों में जिसे ऋत् कहा गया है, कालान्तर में उसे ‘कर्मवाद’ का नाम दिया गया। कर्मवाद इसी ऋत् का विकसित, परिमार्जित एवं संशोधित रूप है। वेदों में कहा गया है — “ऋत् च सत्यम्वाभी तपसोऽध्याजायत्” अर्थात् तपस्या से पहले ऋत् और उसके बाद सत्य की उत्पत्ति हुई। हम यह कह सकते हैं कि ऋत् प्रकृति विधान का तथा नैतिक विधान का नियम है। नैतिक विधान के लिए ही ऋषियों ने देवताओं से अनेक प्रार्थनाएँ की थी। ऋत् वस्तुतः सदाचार का मार्ग है और स्वस्ति पथ ही सदाचार का पथ है। ऋत् मनुष्य के लिए कल्याणकारी मार्ग है। ऋत् कर्मफलदाता है। मित्र और वरुण ऋत् के संरक्षक देवता हैं।

संक्षेप में ऋत् की अवधारणा वेदों की महत्वपूर्ण अवधारणा है, जो प्राकृतिक समरूपता, नैतिक विधान, सदाचरण, सुखों का हेतु एवं कल्याणकारक है। कर्मफल के आधार पर ऋत् श्रेष्ठ कर्मों के लिए पुरस्कार तथा कुत्सित या दुराचार के लिए तिरस्कार की व्यवस्था देकर मनुष्य का नैतिक आचरण के लिए पथप्रदर्शक है। कर्मफल-प्राप्ति के लिए पुनर्जन्म, आत्मोन्नति के लिए संस्कार-निरूपण, समुचित जीवनयापन के लिए सदाचार व कल्याणकारी मार्ग तथा पवित्रता आदि ही के लिए सुसंगत नियम ऋत् पर आधारित है।

सन्दर्भ सूची—

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Seasonal Variations In Physico-chemical Parameters Of Dholawad Dam Special Reference To Khedi Kalan Station Of Ratlam District (M.P.)

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ABSTRACT

The Dholawad dam is situated near village Vasindra, Ratlam (M.P.) India. This medium sized dam is mainly constructed for irrigation purpose but water is also reserved for drinking. It is about 18 km. away from Ratlam city and is surrounded by hills and small villages like khedi khurd, khedi kalan, Dhabaipada and Naya tapra. In the present study the physicochemical parameters of Khedi Kalan station of Dholawad dam water analysed for a period of one year (March 2014 to February 2015). The present study deals with the changes in physico-chemical parameters such as Water Temperature, pH, Transparency, TDS, DO, Total alkalinity, Total hardness, BOD and Chloride. The present study will be beneficial not only academically but also to improve the socioeconomic importance of the water body.

Keywords: Physico-chemical, Dholawad dam, Water, Dissolved oxygen

INTRODUCTION

Water is the most essential element of life. It is the major constituent of the fluids of living organisms. Water is a precious gift of nature on earth. It covers 71% of earth surface. The area of aquatic habitat is more than any other habitat. To understand the aquatic habitat, it is necessary to get the informations of hydrobiology of aquatic resources. Hydrobiological study reveals the relationship of physicochemical characteristics of water with its aquatic flora and fauna available in it. Hydrobiological regime changes from one surface water resource to another. Namdeo *et al* (2013). Quality of an aquatic ecosystem is dependent on the physico-chemical parameters of water. The healthy aquatic ecosystem is depended on the physico-chemical and biological characteristics. Venkatesharaju *et al* (2010).

Material and methods:

a. Study area:

Ratlam known historically as Ratnapuri is a city in the northwestern part of the Malwa region in Madhya Pradesh state of central India. Ratlam is situated in North-West region of Madhya Pradesh from 23 05' North to 23 52' North Longitude and 74 31' East to 75 41' East Latitude. Total Area of Ratlam District is 4861 Sq.km. which is 1.11% of Total Area of Madhya Pradesh. Ratlam has humid subtropical climate. The average rain fall is 37 inches (937mm). Ratlam gets moderate rainfall of 35 to 38 inches (890 to 970mm) from July through September, due to the southwest monsoon. Present investigation is an attempt to develop understanding about the hydrobiological regime of Dholawad dam. This dam is situated in a rural area of Ratlam district and used for drinking water supply, fisheries, irrigation, Cattle bathing and human activities are seen there. This is a medium irrigation dam. It is located in 23° 16' N latitude and 74° 54' E longitude. The Dam constructed at river Jaman a tributary of Mahi River near village Vasindra of Ratlam district. The present study is first

hydrobiological work ever under taken in this reservoir.

b. Sampling and analysis of water :

To study the physicochemical changes and profit structure of Dholawad dam seasonal observations taken for one year (Summer, Rainy and winter) from March 2014 to February 2015. The surface water sample were collected with one liter containers from the dam in between 7 A.M. to 11 A.M. Temperature, Transparency, pH, DO were analysed at the site. The water samples were collected from Dholawad dam from selected station khedi kalan (Intakewell side) for a period of 12 months. Temperature is a important physical parameter. The water temperature was recorded by using thermometer and digital portable kit. Secchi disc was used to measure the transparency of water. The pH was determined by using Hanna pH meter, pH paper and digital portable kit. The chemical parameters of water such as Dissolved oxygen, total alkalinity, total hardness, chloride, total dissolved solids, and BOD etc. were determined by Standard methods APHA (2012), Trivedi and Goel (1986).

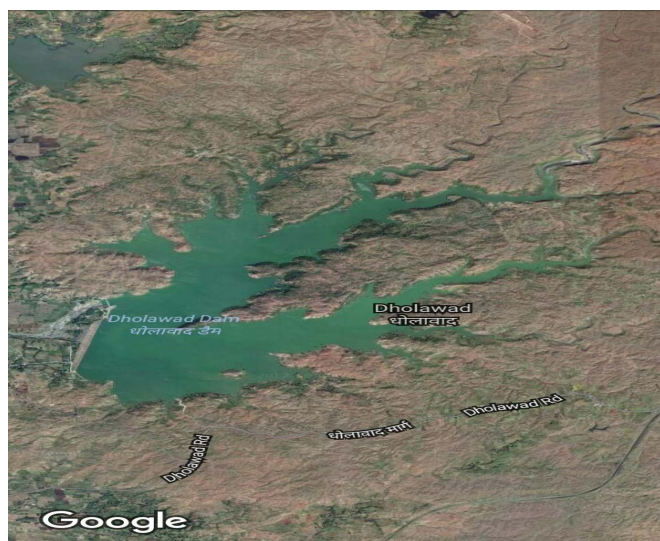


Fig-1 Satellite map of the study area of Dholawad dam

Result and Discussion-

Physico-chemical parameters Khedi kalan station of Dholawad Dam during the period of March 2014 to February 2015 are represented seasonally in the table 1 and seasonal variations in water quality are depicted in figure 1.

Water temperature is determining factor for seasonal distribution of living organisms, solubility of gases and salinity (salts content) in water. In the present study the water temperature ranges from 20 to 31.3°C recorded at the station. The season wise analysis showed that the highest values recorded in summer, moderate in rainy season & lowest in winter season. Pawale and Lokhande (2012) reported the water temperature varies from 21.5 to 31.0°C in Dhanora reservoir. Similar finding were observed in the present study.

The light penetration of transparency of a water body is an important factor on which the productivity of a water body depends. In present investigation the transparency is maximum in winter months 102.32cm and minimum during month of August 29.19cm. Low transparency values may be due to high turbidity levels in August and the high transparency in December due to the subsequent settlement from December. Similar observation reported by M. J. Lubal *et al* (2012) in Mhaswad water reservoir of Satara distt. Maharashtra .

The Total dissolved solids ranges from 280.22 mg/l to 220.46 mg/l the maximum value was recorded in month of August and minimum during month of May. Similar observation reported by Kumari *et al* (2013) in two reservoirs of Narmada River MP, India.

pH plays an important role for the growth of flora & fauna in the Dam. The most of the aquatic organisms are adapted to a average pH & do not withstand abrupt changes. Dholawad Dam ranges from 7.1 to 8.3 maximum 8.3 in the month of March and minimum 7.1 in the month of July. Similar result reported by P. K. Patel (2016) in their study on Fish pond, Shahdol (India). The high pH value was recorded during summer season because aquatic plants use carbon dioxide in

their photosynthetic activities and its removal is responsible for high pH value and minimum pH value was recorded during rainy season.

Dissolved oxygen is very important parameter of water quality and is an index of physical & biochemical processes occurs in water. The dissolved oxygen values are ranges from 6.2 to 9.9 mg/l. Maximum average value 9.9 mg/l of oxygen during the month of December and minimum 6.2 in the month of March. The similar observation of dissolved oxygen reported by R. jain (2008) in singwasa reservoir Guna. In the present investigation the high values of dissolved oxygen during winter seasons was due to low temperature and high photosynthetic activities and low values of dissolve oxygen during summer is due to high temperature and high rate of oxidation of organic matter.

Total hardness ranges from 120.29 to 143.38 mg/L. The minimum values of hardness were observed in the month of January and maximum in the month of May. The similar results were observed by Simpi *et al* (2011) Hosahalli tank in Simoga district, Karnataka. Meshram *et al* (2015) recorded in the range of 107.7 mg/lit to 260.5 mg/lit mg/lit. Maximum total hardness registered was 260.5 mg/lit in the month of May and minimum 107.7 mg/lit in month of November in Balsamudra Lake, of Pauni Dist. Bhandara, Maharashtra.

The total alkalinity ranged between 112.42 mg/l to 130.31mg/l. The maximum value 130.31 mg/l in the month of May and minimum value 112.42 mg/l in the month of January. Similar result reported by M.S. Hujare (2008) his study on perennial tank of Talsande, Maharashtra.

BOD is the volume of oxygen required by bacteria to metabolize the organic compounds under aerobic conditions,(Neeri, 1986). In present investigation lowest BOD value is seen in summer season which is 0.7 mg/l and highest value 1.9 mg/l is recorded in winter. The maximum BOD was noticed during December due to decrease in temperature which leads to increase in microbial activities. Similar results in both seasons observed by Ramulu and Benarjee (2013) in their study on Nagaram Tank of Warangal, Andhra Pradesh.

Chloride is very important inorganic anion in water. Sudden increase in chloride concentration in fresh water is considered to be the indication of pollution. Due to higher Chlorides in the water was recorded in the month of April 26.25 mg/l and minimum value 16.22 mg/l in the month of December. Similar result Noticed by Bade *et al* (2009). Who worked on physicochemical parameters in Sai Reservoir in Latur Maharashtra. Higher concentrations of chloride give a salty taste to water and beverages. The desirable limit of chloride of drinking water is 250 Mg/l as per Bureau of Indian standard.

Table 1

season	Month	Water Temp °c	TDS Mg/l	Transp-arency Cm	pH	Total alkalinity Mg/l	Total hardness Mg/l	DO Mg/l	Chloride Mg/l	BOD Mg/l
Summer	Mar14	31.3	225.16	76.00	8.3	120.43	128.27	6.2	25.00	1.1
	Apr	31.0	223.30	72.81	8.2	122.17	135.00	6.3	26.25	0.8
	May	29.3	220.46	69.61	8.0	130.31	143.38	6.3	25.37	0.7
	Jun	26.2	240.14	63.00	7.8	125.29	138.52	6.4	25.16	0.9
Monsoon	July	24.0	273.46	31.44	7.1	128.52	134.27	6.5	24.74	1.3
	Aug	24.0	280.22	29.19	7.2	129.20	134.44	7.0	23.91	1.2

	Sep	21.2	276.30	38.43	7.2	117.00	135.50	6.9	23.18	1.4
	Oct	21.6	264.36	58.31	7.3	117.34	125.25	7.1	19.00	1.7
Winter	Nov	20.9	258.21	84.24	7.5	119.68	133.23	8.8	18.14	1.8
	Dec	20.0	240.42	102.32	7.5	116.00	126.11	9.9	16.22	1.9
	Jan15	21.4	238.36	99.22	7.7	112.42	120.29	9.2	18.39	1.8
	Feb	26.6	227.20	98.16	7.9	116.25	123.18	7.1	20.27	1.6

Table 1: Physico-chemical seasonal analysis of Dholawad dam of Ratlam, during the month of March 2014 to February 2015

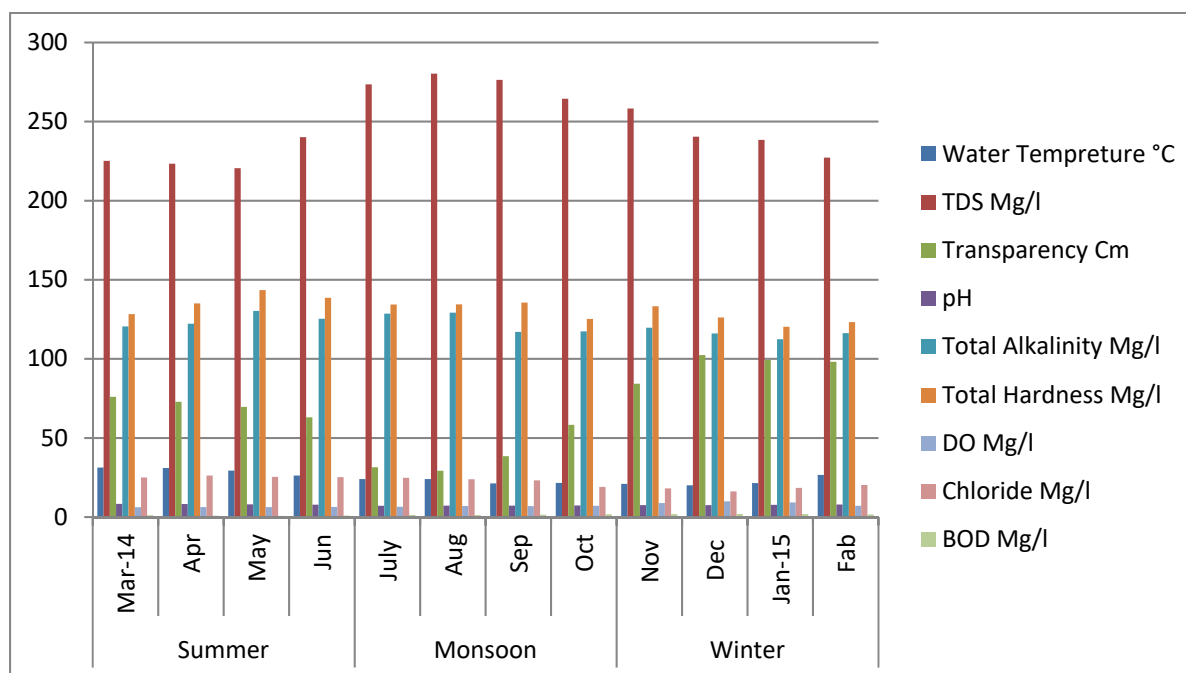


Fig 1: Physico-chemical seasonal analysis of Dholawad dam of Ratlam, during the month of March 2014 to February 2015

Conclusion

Water is unique component of nature and play an important role in the life from molecules to man. The quality of water is described by its physical, chemical and biological characteristics. Therefore it is very essential that quality of drinking water must be monitored regularly at different time interval because the physicochemical characteristics of the aquatic environment directly influence the life inhabiting it. Present study provides a base line data for the monitoring of the pond. A few efforts like presentation of leaching of nutrients from catchment

area through plantations would definitely yield good results. From the present data it is concluded that almost all the parameters are within the prescribed limit of WHO and BIS Standards. The Dholawad dam water is suitable for drinking purposes it is also useful for irrigation and fish culture activities because the physico-chemical parameters are within the range. Aquatic habitats may be in danger in year to come due to excessive exploitation of water for irrigation and other purposes.

Acknowledgement

The author is grateful to the P.H.E. department of Ratlam (M.P.) and Dept. of zoology of Govt. Arts and

Science college Ratlam and Govt. Madhav Science college Ujjain for providing necessary laboratory and library facilities.

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Article

Research Analysis of Tayammum In the light of Qur'an and Ahadith

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Literal Meaning of Tayammum is an 'aim' , or 'purpose' In Islamic Law, it refers to: 'Aiming for seeking soil to wipe one's face and hands with the intention of purification and preparing oneself to pray, and so on."

In 5th Hijri, the revelation of Qur'an Verse for Tayammum was on occasion when the Prophet Muhammad S.A.W and Sahaba Ikram R.A (Companions of Prophet S.A.W) were returning from Ghazwa Bani Mastalaq. Ummul Momineen Hazrat Ayesha R.A was also accompanied with Rasool Allah S.A.W. When the Caravan was about to Reach Medina Munawwara, Hazrat Ayesha Siddiqah R.A come to know that her necklace has fallen down. The Caravan stopped everyone was searching Ummul Momineen's (R.A) Necklace. When the prayer time came Sahaba (Companions) of Rasool Allah S.A.W were tensed as they did not had enough water for ablution. Rasool Allah S.A.W Came to know the situation and So Allah revealed the Divine Verses of Tayammum. The Muslims were pleased to have this favor [1].

Islamic Point of View for Tayammum

Tayammum is Form of purification which is allowed in certain condition when there is no water available to perform Ghushl or Ablution and prayer times are about to end. In this condition a Muslim is allowed to purify with Tayammum and perform Salah (prayer).

Tayammum is a proven practice by Qur'an, Sunnah and Ijma

O Believers! Approach not prayer while you are intoxicated, until you have much sense that what you say, you understand, nor when you are unclean, without taking a Bath except when you are travelling and if you are ailing, or on a journey, or any one of you comes from privy or you have touched women and you do not find water, then take some pure earth and wipe therewith your faces and your hands. Undoubtedly, ALLAH is pardoning and forgiving. [2]

When One do not have availability of water, means if water may be too far or if Water may be harmful in condition of illness or if finding water could be dangerous due to any enemy i.e. any harmful animal or Human. This is allowed for those who are sick, or travelers in journey, or those who don't have water available, and are in need of purification, in intention to get purify and perform prayers can purify through Tayammum. [3]

Above mentioned Verse [2] describes those conditions in which Tayammum is allowed. First is illness. If a person is suffering from some illness and there is fear of getting worse if he/she may do Ghushl or Ablution, in such condition he / she may purify through Tayammum. Second is Travelling. If a person is travelling and he need to do Ghushl, but water is not available or difficult to

get, then he/she may do Tayammum. Tayammum can be done in replacement of both Ghusl and Wudu (Ablution) applied with the required conditions. Third Condition in nature call (defecate or urinate). And fourth is if a person had gone through sexual intercourse or wet dreams and he do not have availability of water can do Tayammum.

Now here it is necessary to explain the medium of Tayammum and what are the conditions for it which are mentioned in the above mentioned verse [2]. Tayammum can be done by purified soil. It is the first layer or surface of the land. According to Allamma Imam Ahmed Raza Fazil Bareilvi A.R, Soil or any form of it which could be stone, sand, gypsum etc. can be used for Tayammum. [4]

The procedure of Tayammum is different according to Fuqaha. Some explains the procedure as First, one must have the intention to perform ablution and purifying himself, then he mentions Allah's name, strikes the soil with his hands, and wipes his face and then second time strike again and wipes his hands up to the elbow, starting with the right hand. Imam Abu Hanifa (A. R), Imam Shafai (A.R), Imam Malik (A.R) and most of the Fuqaha follow this procedure of Tayammum, and Sahaba (companion of Prophet S.A.W) and Tabaeen (Those Muslims who met Sahaba). While some accept the procedure that one must Allah's name, strikes the soil with his hands, and wipes his face and hands up to the wrist. Imam Ahmed bin Humble (A.R) also follow and preach this procedure of Tayammum and usually people following Ahl-e-Hadiths do follow the same procedure.

It is not necessary to strike the hand on earth surface. For Tayammum any dusty dry element can be used which is clean, pure and formation of soil like sand etc. Some people think that how can one have purification by striking on soil in such manner. However literally this procedure is for

making one feel purified. And it will make one feel purified even he/ she is not able to have water for long time. And he/she will be following the principle of purification in Sharia. Further he will not forget the difference between allowed conditions for praying and those which are restricted. [5].

Whoever moves toward becoming Junub whether as the consequence of a wet dream, or intercourse with a women needs to do ghusl and supplicate. On the off chance that he can't do ghusl on the grounds that there is no water or in light of the fact that he will be hurt by utilizing it –, for example, on the off chance that he is debilitated and utilizing water will aggravate his problem, or there is a cold breeze and he fears that on the off chance that he does ghusl he will end up noticeably wiped out with a migraine or frosty or bronchitis – then he ought to do tayammum and ask. This applies similarly to men and ladies. He (or she) doesn't have the privilege to postpone the petition past its recommended time. [6].

Returning from a Journey, Ummul Momineen Hazrat Ayesha R.A was likewise went with Rasool Allah S.A.W. At the point when the Caravan was going to Reach Medina Munawwara, Hazrat Ayesha Siddiq R.A come to realize that her jewelry has tumbled down. The Caravan halted each one was looking Ummul Momineen's (R.A) Necklace. At the point when the petition time came Sahaba (Companions) of Rasool Allah S.A.W were strained as they didn't had enough water for ablution. Rasool Allah S.A.W Came to know the circumstance thus Allah uncovered the Divine Verses of Tayammum. The Muslims were grateful to ALLAH and Praised Hazrat Ayesha Siddiq R.A). Tayammum has binding that one should have intention to be purified first of all then start with saying Bismillah and strike the inner side of the hand (palm) with stretched fingers , on the pure soil and first wipe the face, and again repeat

the strike of hands on soil and wipe the hands up to elbow. [7]

if you are ill or you are on a journey, or any of you comes from privy or you have intercourse with women and in these conditions you do not get water then strike your hands on pure soil and wipe therewith your faces and again strike and wipe your hands up to elbows. This (Tayammum) will become replacement of wudu. ALLAH blesses upon you and teach you those which is easy for you and He is the most merciful and may forgive your sins. [8]

This Verse asset of the issues and benefits, which has been discussed in detail by Hanafis (those who follows Imam Abu Hanifa A.R) and Shafai (Those who follows Imam Shafai A.R), in their summaries.

Some of the points are listed below:

- 1) Unlike other books of ALLAH, Holy Qur'an was not revealed in one time as whole. But it was revealed as per different occasions happened with Sahaba-e-Rasool (S.A W), and hence ALLAH made Sahaba, a blessing for Muslims. For Hazrat Ali (R.A) Alcohol was prohibited, Due to Hazrat Umar (R.A) sexual intercourse was allowed in Ramadan Nights, and because of the incident of lost necklace of Hazrat Ayesha (R.A), Ummah was blessed with Tayammum. So those who do not are oblige the Sahabas are selfish.
- 2) In case of such condition after intercourse, or after menses, Prayers are not allowed without purification. And if water is not available then Tayammum is a blessing.
- 3) If one do not have water means if water may be too far or if Water may be harmful in condition of illness or if finding water could be dangerous due to any enemy i.e.

any harmful animal or Human. In all of these condition Tayammum is allowed. A reference to this could be seen in the Prayers of Imam Hussain (R.A) when near river Farad he performed with purification of Tayammum.

- 4) Pure form of soil is allowed for Tayammum, pure soil are those which are made of soils, and are not burned in fire and or are not transformed into ashes, such as sand , stone , mineral coal, mineral salt etc.
- 5) Impure soil cannot be used for Tayammum, as for those things which are not pure how can one use it for purification. And intention is the first condition as discussed earlier as Tayammum meaning shows that it is an aim / intention for purification
- 6) In Tayammum we need to wipe the hands up to elbow, as we wash our hand in ablution (Wudu).
- 7) In these verses, touching women means having intercourse with women.as explained earlier, that only in case of intercourse the ghusl is required and hence Tayammum will also be done in such condition and touching women doesn't require ablution or ghusl.
- 8) In journey intercourse with wife is allowed as water availability is not a condition for having intercourse and one can do Tayammum as replacement.

Tayammum is revealed as blessing of ALLAH to the Ummah. As mentioned in Qur'an and Ahadith, below are Ahadith and Qur'an verse which explained the blessing of ALLAH by revealing Tayammum

As per Qur'an:

O Believers! When you wish to stand for prayers, then wash your faces and your hands up to the elbows and pass your wet hands over your heads and wash your feet up to your ankles. And if you are in need of bath, then purify yourself well. And if you are ill or you are on a journey, or any of you comes from privy or you have intercourse with women and in these conditions you do not get water then betake your selves to clean earth and wipe therewith your faces and your hands. Allah desire not that He should place you in any difficulty, Yes, He desires to purify you well and to complete His favors upon you so that you may be grateful. [9].

Several Ahadiths also mentions this blessing such as:

Narrated by Hazrat Imran (R.A), "We were on a journey with Rasool Allah (S.A.W), and Prophet (S.A.W) lead us to offer prayer (Jamat) after the prayer we saw a man was sitting alone on a side. The Prophet (S.A.W) asked him that why did he not prayed with the people (jamat) and he said he need to have ghushl and water was not available. Rasool Allah (S.A.W) then replied, "Take the Sand which is enough for you" [10]

Another Hadith Narrated by Hazrat Abu Zar (R.A) that Rasool Allah (S.A.W) said "Clean earth is the wudu' of the Muslim if he cannot find water for ten years." Then he said: "When you find water, then make it touch your skin." [11]

These verses and Ahadith and Ijmas discussed in this article clearly described that Tayammum is a fully replacement of Wudu in case of discussed conditions.

And any prayer or ritual for which wudu is required can be performed with Tayammum.

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Role of NGOs in Promoting Eco-Tourism: A Case Study of Kashmir

Aijaz Ahmad Bund

ABSTRACT

NGO play's an indispensable role in tourism management. Their task is to assist the government, private sector and communities in implementing, monitoring and evaluating responsible tourism. They attract funding from donor agencies to develop specific community-based tourism projects and also assist the government in conducting tourism and environmental awareness programmes among communities and the tourist industry at large. Tourism is important for many developing countries, as it is a source of foreign investment, foreign currency, entrepreneurial initiation, service-based job creation and local social enhancement. Many local and international NGOs are taking part in this development. An important part of sustainable tourism is ecotourism. Ecotourism is about uniting conservation, communities, and sustainable travel. It is seen by many as a way to bring economic development hand-in-hand with nature conservation. NGOs have emerged in the last decade as one of the principal advocates and implementers of eco-tourism practices. Therefore, many NGOs concerning international development seek to engage in ecotourism initiative. This paper will throw light on the role of NGOs and how they promote ecotourism in Kashmir.

Keywords: Eco-Tourism, Non-Governmental Organizations (NGOs), Case Study, Kashmir

INTRODUCTION

Mass tourism has been widely used as a development tool for boosting national, regional, and local economies worldwide. Recently numerous negative impacts associated with mass tourism have been recognized. Sustainability of the local culture, social structure, economic well-being and way of life are common goals that are inherently interconnected with the health of the natural resource base. The tourism industry, through ecotourism, is natural resource based but is also one of the competing use or demand of these resources. In recent years, there has been a rapid growth in the number of international tourists worldwide, from 528 million in 1995, to 1.085 billion in 2013, and that number is expected to rise to 1.6 billion in 2020. Tourism is important for many developing countries, as it is a source of foreign investment, foreign currency, entrepreneurial initiatives, service-based job

creation, and local social enhancement (UNWTO, 2015).

In September 2015, the UN member states adopted the 2030 Agenda for Sustainable Development. In January 2016, the Sustainable Development Goals were set to come into effect, replacing the Millennium Development Goals from 2000. The importance of sustainable tourism is stated using three indicators, under three different goals. An important part of sustainable tourism is ecotourism, globally one of the fastest-growing tourism markets. It is seen by many as a way to bring economic development hand-in-hand with nature conservation. Therefore, many non-governmental and not-for-profit organizations (referred to in this piece as NGOs) concerning international development seek to engage in ecotourism initiatives.

Tourism is included as targets promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; Sustainable Consumption and Production and conserving and sustainably using the oceans, seas and marine resources for sustainable development. Ecotourism is defined as “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education”. It represents a set of principles that have so far been successfully implemented in various global communities, and are supported by extensive industry and academic research. When properly executed, ecotourism exemplifies the benefits of socially and environmentally sound tourism development. “Ecotourism is about uniting conservation, communities, and sustainable travel. This means that those who implement, participate in, and market ecotourism activities should adopt the following ecotourism principles: (1) Minimize physical, social, behavioral, and psychological impacts; (2) Build environmental and cultural awareness and respect; (3) Provide positive experiences for both visitors and hosts; (4) Provide direct financial benefits for conservation; (5) Generate financial benefits for both local people and private industry; (6) Deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries’ political, environmental, and social climates; (7) Design, construct and operate low-impact facilities; (8) Recognize the rights and spiritual beliefs of the Indigenous People in your community and work in partnership with them to create empowerment” (TIES, 2015).

In nutshell, the term ecotourism refers to tourism-related activities in and around its protected areas, and focuses on management tools, systems, and processes that guarantee these three elements: (1) biodiversity and ecosystem conservation; (2) education and learning to enable hosts and visitors to understand and engage with management approaches to protect and conserve the natural and cultural assets of these areas; and, (3) economic and social benefits to communities in and around protected areas that (a) reduce their demand for the

natural assets of these areas, and (b) engage them in collaborative approaches to protected area management.

NGOs and Ecotourism

NGOs have emerged in the last decade as one of the principal advocates and implementers of ecotourism practices. For tourism and conservation, NGOs are the organizations that have diverse memberships composed of community adherents, the tourism industry, conservationists, social activists, and so on. Thus NGOs also act as specialized groups of stakeholders, for example environmentalists or consumer advocates. NGOs also have non-membership associations, such as the Pacific Asia Tourism Association (PATA). Many NGOs are moving forward with the general concept of sustainability, but are also developing projects of their own, experimenting with different approaches to achieve their sustainability and conservation goals. Conservation is the primary mandate of several international as well as national and local NGOs such as the World Wide Fund for Nature (WWF) and the Wildlife Conservation Society (WCS). Many of these organizations have embraced ecotourism as a form of development that is complementary to the goals of their conservation efforts. This is mainly due to ecotourism’s relatively modest negative impact on natural and cultural environments, compared with many other economic activities. It is also partly due to ecotourism’s ability to provide opportunities for economic benefits to communities residing in the landscapes which these NGOs seek to conserve. International NGOs such as the Nature Conservancy and Conservation International demonstrate their belief in ecotourism as a development and conservation tool through the operation of ecotourism departments within their institutional frameworks (Weaver, 2001).

NGOs have mainly focused on four essential components of ecotourism. They are:- (1) ecotourism-related financing mechanisms for conservation; (2) the establishment of tourism industry and resource management standards and especially voluntary guidelines; (3) research on the challenges facing the

management of natural resources and ecotourism's ability to address these issues; and (4) the education of stakeholders regarding solutions for coastal resource usage problems, including the implementation of genuine ecotourism. NGOs play a leading role in making visitor fees a successful option for funding national parks. The external NGOs help by building a coalition of support for fee establishment or a fee increase, while local NGOs serve as a voice for particular interest groups, for example managers of a particular coastal destinations or coastal user groups. The NGOs work in tandem with government agencies, and sometimes the tourism industry, to establish an equitable and feasible fee system for parks. Regulations, codes of conducts for tourists, and codes of practice for the industry are all part of larger efforts to set standards for conducting marine tourism and ecotourism in a given setting. NGOs also help with researching the issues related to the feasibility of ecotourism practices along with nature conservation and sustainable development. The research is only useful if it is distributed to policy-makers, scientists, managers, and the general public. Many NGOs are involved in a wide range of educational activities in general, and in ecotourism education-related issues in particular (Garrod & Wilson, 2003).

Though the preservation of biological diversity is urgent, insufficient, and underfunded. Practical management involves social as well as natural sciences, thus including multiple stakeholders - private, community and non-government organizations (NGOs) as well as government and multilateral agencies. Amongst these stakeholders, NGOs are believed to have an increasingly important role, through: formal and informal political lobbying; buying or covenanting land for conservation; and forming partnerships to undertake specific conservation projects. Thus establishing conservation-oriented ecotourism enterprises is one such approach. These enterprises aim to switch land and resource use from consumption to conservation, and to resist external threats such as large-scale land use change associated with primary industries. The relationship between these stakeholders is often complex, and the partnership arrangements influence

the governance, management and the outcomes of projects. NGOs use different approaches and strategies, with different outcomes, in developed and developing countries respectively. Some analysts have argued that NGOs have successfully used ecotourism as a local conservation tool, either by operating tours, influencing the management of protected areas, or raising local awareness. Overall, it appears that NGO actions and strategies are determined partly by historical, environmental and legislative contexts in the countries, cultures and communities concerned; and partly by the internal history and structure of each NGO as an organization. Many authors as per the previous studies have suggested that NGOs in developed countries preferentially operate ecotourism enterprises themselves, or form partnerships with the government agencies in tourism policy and management for protected areas.

NGOs do certainly play a noteworthy role worldwide in the use of ecotourism for conservation, particularly through community-based approaches associated with protected areas in developing countries. Projects proposed by the NGOs adopt different management structures and different NGO roles, from projects proposed or established by local communities, private tour operators, or government agencies. In developing countries, rather than relying on national governments, NGOs endeavor to undertake conservation activities directly, including community engagement and revenue generation through ecotourism. Historically and at global scale, collaboration between the private tourism sector and the NGOs has not increased the proportion of successful ecotourism projects. It also indicates that the proportion of successful projects is greater for the NGOs working individually than for those collaborating with other NGOs (Brito, Buckley and Byrne, 2016).

OBJECTIVES OF THE STUDY

1. To throw light on the role of NGOs and how they promote ecotourism in Kashmir.
2. To recommend certain suggestions in order to promote ecotourism in Kashmir.

METHODOLOGY

The present study relies entirely on the secondary sources of data which is gathered from different books, journals, research papers, government reports, official records, newspapers and other unpublished material. The study area for the present study is chosen to be the Kashmir valley.

DISCUSSION & RESULTS

Eco-tourism in Kashmir

As per Hindustan Times report, “Eco-tourism gives tourists myriad experiences of the countryside and also helps locals living in remote areas. Under the eco-tourism project, the state promotes adventure tourism, trekking, water rafting, bird watching, fishing, night camps, forest camps, wetland visits and wildlife education. The virgin and untouched areas of the state make it perfect for eco-tourism. The potential eco-tourism activities attract different type of visitors and tourists in Kashmir for travelling in dense woods, trekking, long excursions, jungle tours, camping, wildlife education and viewing, bird watching and wetland visits. Viewing of rivers borders, springs, lakes, water wildlife species, water rafting, canoeing, fishing and boating besides dances, cultural folk and folk music are the part of eco-tourism in Kashmir also.” (Hindustan Times, 2009). Few years back the Department of Environment had pushed a proposal to the government for constituting Eco-Tourism Board with an aim to recommend measures and identifying potential sites for promotion of Eco-Tourism in Jammu & Kashmir because we all know that Jammu & Kashmir has great potential for Eco-Tourism and developing this sector has to be given utmost importance by the Government in view of the greater demand from foreign as well as domestic tourists (Daily Excelsior, 2015).

Around the world eco-tourism is flourishing so far. Thus for Kashmir, eco-tourism is also becoming an important economic activity. It provides opportunities for visitors to experience nature, and to learn about the importance of biodiversity conservation and local cultures. At the same time,

eco-tourism generates income for conservation programs and economic benefits for communities living in rural as well as remote areas. But not all tourism to natural areas is eco-tourism. We are witnessing a rush to natural areas that, in many cases, is undermining the values that make these areas attractive. Because of their ecological value, nature areas, especially those within a wildlife protected area system, contain many of the greatest eco-tourism attractions. These attractions may consist of rare or endemic species of flora or fauna, high indices of species diversity, unusual or spectacular geomorphologic formations, or unique historic or contemporary cultural manifestations in a natural context. Protected area managers, then, are faced with the challenge of controlling and limiting the impacts of unfettered nature tourism while at the same time deciding where and how to plan adequately for the development of eco-tourism as a compatible economic development option. In such a case, the eco-tourism planning process is critical to achieving eco-tourism’s potential as a powerful conservation strategy. The distinct but intimately interrelated aspects of eco-tourism, conservation management, and business development, must be fully understood by ecotourism planners and protected area managers before moving ahead with plans to implement ecotourism activities (Greater Kashmir, 2013).

CONCLUSION

Conservation and development groups play a significant role in defining and directing the improvement of eco-tourism. They also serve as essential sources of financial and technical assistance for eco-tourism projects on the ground. Moreover, they facilitate negotiations between local communities and tourism developers, ensuring that the adequate links and mutual benefits are obtained. In addition, these groups often have members or constituencies that seek information and guidance on eco-tourism issues. Their support for particular eco-tourism projects contribute significantly to their success. The essential mandate of an eco-tourism organization is to minimize the negative impacts of eco-tourism and to maximize the positive impacts.

The number of organizations striving to accomplish this in Kashmir is growing rapidly, along with the popularity of eco-tourism itself, against the backdrop of the transition the state is experiencing.

One of the problems with the involvement of development NGOs in eco-tourism is that some forms of eco-tourism require that the development be based around non-consumption and rules out transformative development. Eco-tourism's popularity as a development option devalues human advancement by linking it to external, Western concepts of conservation priorities. Sometimes, conservation is emphasized more than development. Moreover, in some cases when the Western-orientated NGO approach to eco-tourism is based on a "strong" view of sustainability, the voice of the receiving communities is missing (Butcher, 2007). NGOs will continue to be engaged in ecotourism activities, in Kashmir and elsewhere. By comparing different kinds of NGOs (for example international – local), the NGOs themselves can more easily adapt to the current trends and achieve their goals in the best way. But most importantly, international and local NGOs should work together with and for the local communities.

Among the proposed 17 goals of sustainable development goals (SDGs), 4 goals are directly focusing on environment, eco system, biodiversity and water. Achieving the goals of sustainable development vis a vis environment and tourism with special reference to Jammu & Kashmir is only possible when we preserve and protect our environment by making ourselves and our younger generation aware about environment and ecology. Environmental education is a key driver for sustainable development and there is an urgent need of a greater coordination of Forest (including wildlife) and Tourism departments in J&K so that we can maintain the ability of our natural systems which further provide the natural resources, ecosystem and tourism services. Most of our state's economy is dependent on natural resources and that is why there is a dire need to protect these resources. The role of Non Governmental Organizations (NGOs) is also of great importance while we work on development of our

eco-tourism in Jammu & Kashmir. There are many experts in NGO sector who have a vast and in-depth knowledge in this field and their services should be availed by the Government. The recent move of the J&K Government to involve Eco-Tourism Society of India is a welcome step in this direction. Honorary Secretary of Eco-Tourism Society of India Rakesh Mathur who visited Srinagar recently to have discussion with Government about strengthening this sector indicates that Government is serious about making eco-tourism a reality in J&K. We hope government will not stop here as we have a very bad experience in past. The previous Government did not create the eco-tourism development board nor did it involve other stakeholders. We hope more and more people, NGO experts and stakeholders are involved in the process of making Jammu & Kashmir a hub of eco-tourism. We need to preserve our natural resources for future generation without causing any harm to the nature and its other components. Eco-tourism ties together concern for the carrying capacity of natural systems. The recent initiative taken by the Department of Environment Ecology and Remote Sensing by organizing first ever Forest Food Festival at Srinagar in collaboration with Centre for Conservation of Culture & Heritage (CCCH Trust) and Institute of Hotel Management (IHM) Srinagar is also being hailed by the people from Tourism sector. I hope many more forest food festivals are organized in other areas of our state so that people explore these herbs and start value addition of these products and market them commercially. J&K's Tourism Ministry must make it sure that all the Tourism development authorities must create a cell in coordination with Forest, Environment and Wildlife Departments so that some small research is done locally on forest herbs etc. Various food items like Machran Chai, Pamb Haakh Sabzi, Wopal Haakh Parathas, Tethwan Pulao, etc can be prepared from locally available edible forest herbs and these food items should be made available at all those places where the foreign tourists visit (ibid, Daily Excelsior, 2015).

SUGGESTIONS

Following are the few recommendations suggested in order to balance the ecotourism through other sectors of the valley:

1. Protected Area Personnel: Since protected areas in Jammu and Kashmir are eco-tourism's primary "commodity", protected area personnel have to play a central role in eco-tourism development and management. Protected area personnel are usually the primary information resources concerning the flora and fauna in their areas. They also are the day-to-day caretakers of these natural resources and have the most responsibility for their immediate conservation.

2. Local Communities: Communities living around or in close proximity to protected areas in Jammu and Kashmir are frequently overlooked in tourism development and management. Sometimes this is because they are scattered and isolated making communication difficult. At other times the eco-tourism implementing agencies wish to avoid taking the time and effort to inform local communities of specific tourism development plans, or seek to marginalize them so as to deprive them of anticipated economic benefits. However, the needs of local communities should be taken fully into account, particularly since they are often dependent on the natural resources that attract tourists to an area. The planning process should initiate the development of mechanisms that ensure that local communities receive a share of the benefits of tourism development. But most especially, local communities should be consulted on what level of tourism development they consider is appropriate — both in their immediate environment and in the area as a whole. If their involvement is not sought, eco-tourism will certainly not be possible.

3. Tourism Industry: Tour operators have a great deal of influence on the destinations, activities and overall experience of tourists. It is therefore crucial that they understand the concept of eco-tourism and the conservation requirements of protected areas. They need to be fully aware that the eco-tourism product they are trying to promote is fragile and must be carefully preserved. The tourism

industry is also an important partner since it is a vital source of information about demand trends, promotion and marketing.

4. Financial Institutions: If protected area management and local communities are to capture a greater share of the financial benefits of eco-tourism, most of them will be obliged to invest in development of infrastructure. Diverse funding sources will be essential. Banks, investment corporations, bilateral and multilateral international development agencies, and private investors could all have an important role in supporting, and providing initial financing for appropriate tourism planning and development. That is why so far this is one of the reasons why international development agencies like World Bank and Asian Development Bank, have set up environmental departments within their organizational structures and carry out environmental impact assessments before funding the projects.

5. Consumers: Eco-tourism's driving force consists of the consumers themselves. They decide where to go and what to do for recreation or vacation in protected areas. So their thoughts and preferences should be considered very seriously in any eco-tourism planning strategy. But they must be "educated" about the costs and benefits of eco-tourism to enable them to make wise travel decisions and actually participate in conservation efforts when they travel.

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