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ENVIRONMENTAL IMPACT ASSESSMENT OF PROPOSED AIRPORT IN AP CAPITAL REGION

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Abstract: ***In the year of 2nd June 2014 AP State is bifurcated in to two states, Andhra Pradesh and Telangana. The new state Andhra Pradesh doesn't have any capital city. So the AP government has formed capital region and constituted Andhra Pradesh Capital Region Development Authority(APCRDA). In that region an international airport was proposed. So, a well designed airport system is a prime requirement for industrial development, operational safety, efficiency and economic sustainability of a state. The APCRDA proposed internal airport at three optional locations, Mangalagiri, Tadikonda, Chikkavaram, and finally they finalized that Mangalagiri as the best suitable place for new airport location in Andhra Pradesh State. Through this paper, this work is carried out to check the suitability of airport location for environmental perspective. All the THREE locations of proposed airport by APCRDA were compared by carrying out Environmental Impact Assessment using RIAM software. All the possible impacts of the proposed airport at the three locations were studied and used to compare using RIAM. In RIAM the impacts like social, cultural, physical, chemical, biological, operational, economical and ecological were considered. They were quantified by a procedure and the analysis was performed to obtain an environmental score. So the output of RIAM Software gives Chikkavaram as the best suitable location for the proposed air port.***

Key Words: Environmental Impact Assessment, APCRDA, Airport construction, Airport development, RIAM software.

I. INTRODUCTION

Environmental Impact Assessment (EIA) is a study to indentify, predict, evaluate, and communicate information on the environment of a proposed project and to detail out the mitigating measures prior to project approval and implementation. The EIA is essentially a planning mechanism for preventing environmental problems due to an action. It ensures that the potential problems are foreseen and addressed at an early stage in the project planning and design. Thus this will avoid costly mistakes in project implementation, either because of the environmental damages that are likely to arise during project implementation, or because of modifications that may be required subsequently in order to make the action environmentally acceptable.

The purpose of the Environmental Impact Assessment (EIA) report is to investigate and assess the principal environmental concerns associated with the proposed airport. The scope of the Environmental Impact Assessment (EIA) study covers both the construction phase and the operational stage of the airport, investigating and analysing.

Environmental Impact Assessment (EIA) is a planning tool which enables decision makers to accept environmentally friendly projects and reject environment damaging projects or their certain components. EIA has been mandatory in Nepal since the enactment of Environment Protection Act in 1997. Usually in Nepal, EIA is done for a project late in the project cycle after many important decisions on design and locations have already been made. While in case of government sponsored projects, EIA has remained as 'pro forma' compliance with government's legal requirements.

This paper analyses outputs of approved EIA of a mega infrastructure project "Second International Airport Project" which government wants to implement despite of protests by conservationists, and environmental and social activists. There are technocratic problems in EIA Report such as informational weaknesses, insufficient analysis of impacts, and inadequately proposed mitigations measures. It indicates political influence on EIA. This paper suggests making policy decision on size and nature of an international airport and its facilities, alternative locations avoiding ecologically sensitive area, and source of funding. It proposes to conduct a comprise.

Importance of EIA:

- EIA is potentially a useful component of good environmental management.
- It is the Government policy that any industrial project has to obtain EIA clearance from the Ministry of Environment before approval by the planning commission.

Ojectives:

- Selection of locations of airports proposed by APCRDA region.
- Identification of positive and negative impacts of particular airport locations.
- Identify the impacts of establishment of new airports.
- Identification of parameters presented in location of airport proposed by APCRDA region.
- Finding the all the requirements of airports
- Input the various location and their respective values, impacts and parameters to get the best output result.

II. STUDY AREA

Option-1:Mangalagiri

Mangalagiri is a town in Guntur district situated between the twin cities of Vijayawada and Guntur of the Indian state of Andhra Pradesh. The town is the headquarters of Mangalagiri Mandal under Guntur revenue division. It is a major suburb of the cities of Vijayawada and Guntur.

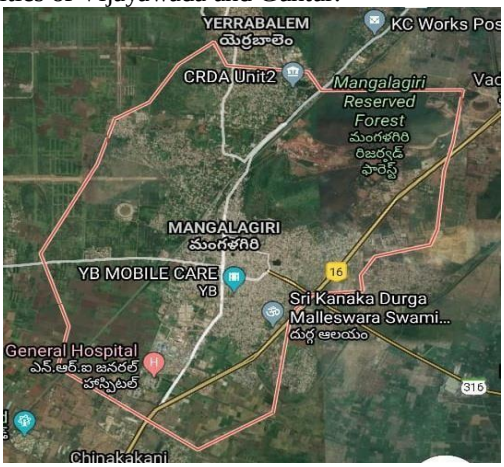


Fig.1. Study area-Option-1: Mangalagiri

Option-2:Tadikonda

Tadikonda is a village in Guntur district of the Indian state of Andhra Pradesh. It is located in Tadikonda Mandal of Guntur revenue division. It forms a part of Andhra Pradesh Capital Region.

Fig.2. Study area-Option-2: Tadikonda

Option-3:Chikkavaram

According to Census 2011 information the location code or village code of Chikkavaram village is 589231. Chikkavaram village is located in Gannavaram Tehsil of Krishna district in Andhra Pradesh, India. It is situated 8km away from sub-district headquarter Gannavaram and 78km away from district headquarter Machilipatnam. As per 2009 stats, Chikkavaram village is also a gram panchayat. The total geographical area of village is 1249 hectares. Chikkavaram has a total population of 1,666 peoples. There are about 505 houses in Chikkavaram village. Vijayawada is nearest town to Chikkavaram which is approximately 32kmaway

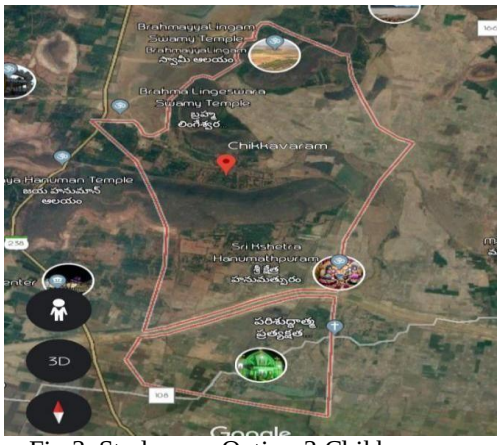


Fig.3. Study area-Option-3:Chikkavaram

III. METHODOLOGY

We are following this methodology for finding the best place to construct airport in the APCRDA region. The following are the methods we followed. They are Literature study, Study area selected, Identifications of Environmental impact, RIAM Tools, Assessment of environmental impact, Identification of best suitable location, Results & Discussion, Conclusion.

RIAM Analysis

This paper describes a system of scoring within a matrix that has been designed to allow subjective judgments to be quantitatively recorded, thus providing both an impact evaluation and a record that can be re-assessed in the future. The system is ideally suited to EIA where a multi-disciplinary team approach is used (Morris & Biggs, 1995), as it allows for data from different components to be analysed against common important criteria within a common matrix, thus providing a rapid, clear assessment of the major impacts. The Rapid Impact Assessment Matrix (RIAM) method is based on a standard definition of the important assessment criteria as well as the means by which semi-quantitative values for each of these criteria can be collated to provide an accurate and independent score for each condition. The impacts of project activities are evaluated against the environmental components and for each component a score (using the defined criteria) are determined, which provides a measure of the impact expected from the component The important assessment criteria fall into two groups:

Criteria that are of importance to the condition, and which can individually change the score obtained.

Criteria that are of value to the situation, but individually should not be capable of changing the score obtained.

The value ascribed to each of these groups of criteria is determined by the use of a series of simple formulae. These formulae allow the scores for the individual components to be determined on a defined basis.

The scoring system requires simple multiplication of the scores given to each of the criteria in group (A). The use of multiplier for group is important for it immediately ensures that the weight of each score is expressed, whereas simple summation of scores could provide identical results for different conditions.

Scores for the value criteria group (B) are added together to provide a single sum. This ensures that the individual value scores cannot influence the overall score, but that the collective importance of all values in group (B) is fully taken into account.
The sum of the group (B) scores is then multiplied by the result of the group (A) scores to provide a final assessment score (ES) for the condition. The process can be expressed:
(a1) x (a2) = aT
(b1) + (b2) + (b3) = bT
(aT) x(bT)=ES
Where (a1) and (a2) are the individual criteria scores for group (A) (b1) to (b3) are the individual Criteria scores for group (B)
"aT" is the result of multiplication of all (A) scores "bT" is the result of summation of all (B) scores ES is the assessment score for the condition.
Positive and negative impacts can be demonstrated by using scales that pass from negative to positive values through zero for the group (A) criteria. Zero thus becomes the 'no-change' or 'no-importance' value. The use of zero in this way in group (A) criteria allows a single criterion to isolate conditions which show no change or are unimportant to the analysis.
Zero is a value avoided in the group (B) criteria. If all group (B) criteria score zero, the final result of the ES will also be zero. This condition may occur even where the group
(A) Criteria show a condition of importance that should be recognized. To avoid this, scales for
Group (B) criteria use '1' as the 'no-change/no-importance' score.
Assessment Criteria:
The criteria should be defined for both groups and should be based on fundamental conditions that may be affected by change rather than be related to individual projects. It is theoretically possible to define a number of criteria, but two principles should always be satisfied:The universality of the criterion, to allow it to be used in different EIAs.The value of the criterion, which determines whether it should be treated as a Group Or Group (B) condition.At this point only five criteria have been developed for use in the RIAM. Nevertheless, these five criteria represent the most important fundamental assessment conditions for all EIAs, and satisfy the principles set out above. These criteria, together with their appropriate judgments scores are defined

Group (A) Criteria:
Importance of condition (A1)
A measure of the importance of the condition, which is assessed against the spatial boundaries or human interests it will affect. The scales are defined:
4=important to national/international interests
3=important to regional/national interests
2=important to areas immediately outside the local condition
1=important only to the local condition
0=no importance.

Magnitude of change/effect (A2)
Magnitude is defined as a measure of the scale of benefit/dis-benefit of an impact or a condition:
+3=major positive benefit
+2=significant improvement in status quo
+1=improvement in status quo 0=no change/status quo
-1=negative change to status quo
-2==significant negative dis-benefit or change
-3=major dis-benefit or change.

Group (B) Criteria:
Permanence (B1):
This defines whether a condition is temporary or permanent and Should be seen only as a measure of the temporal status of the condition. (e.g.: an embankment is a permanent condition even if it may one day be breached or abandoned; whilst a coffer dam is a temporary condition, as it will be removed).
1=no change/not applicable
2=temporary
3=permanent.

Reversibility (B2):
This defines whether the condition can be changed and is a measure of the control over the effect of the condition. It should not be confused or equated with permanence. (e.g.: an accidental toxic spillage into a river is a temporary condition (B1) but its effect (death of fish) is irreversible (B2); a town's sewage treatment works is a permanent condition (B1), the effect of its effluent can be changed (reversible condition) (B2)).
1=no change/not applicable.
2=reversible.
3=irreversible.

Cumulative (B3):
This is a measure of whether the effect will have a single direct impact or whether there will be a cumulative effect over time, or a synergistic effect with other conditions. The cumulative criterion is a means of judging the sustainability of a condition, and is not to be confused with a permanent/irreversible situation.
For instance, the death of an old animal is both permanent and irreversible, but non-cumulative as the animal can be considered to have already passed its breeding capabilities. The loss of post-larval shrimp in the wild, is also permanent and irreversible, but in this case cumulative, as all subsequent generations that the larvae (as adults) may have initiated will also have been lost.
1=no change/not applicable
2=non-cumulative/single
3=cumulative/synergistic
It is possible to change the cumulative component to one of synergism, if the condition warrens consideration of additive affects

Environmental Components:
The RIAM requires specific assessment components to be defined through a process of scoping; and these environmental components fall intone of four categories, which are defined as follows:

Physical/chemical:
Covering all physical and chemical aspects of the environment, including finite (non-biological) natural resources, and degradation of the physical environmental by pollution.
Biological/ecological:
Covering all biological aspects of the environment, including renewable natural resources, conservation of biodiversity, species interactions, and pollution of the biosphere.

Sociological/cultural:
Covering all human aspects of the environment, including social issues affecting individuals and communities; together with cultural aspects, including conservation of heritage, and human development.

Economic/operational:
To qualitatively identify the economic consequences of environmental change, both temporary and permanent, as well as the complexities of project management within the context of the project activities.
The use of these four categories can be, in itself, a competent tool for EIA, though each category can be further sub-divided to identify specific environmental components that better demonstrate the possible impacts. The degree of sensitivity and detail of the system can thus be controlled by the selection and definition process for these environmental components.

Ranges:
To use the evaluation system described, a matrix is produced for each project option. The matrix comprises of cells showing the criteria used, set against each defined component. Within each cell the individual criteria scores are set down. From the formulae given above each ES number is calculated and recorded.
No claim is made for the sensitivity of any ES value, and to provide a more certain system of assessment, the individual ES scores are banded together into ranges (Range values: RV) where they can be compared (Table).
Ranges are defined by conditions that act as markers for the change in bands. These conditions would normally reflect the changes in group (A) scores, combined with the upper or lower scores possible with the group (B) criteria.
Conditions have been defined to produce a range covering 5, and the limits of the bands in this range can be defined as follows:
Conditions that have neither importance nor magnitude will score a zero and can be banded together. Any conditioninthisbandiseitherofnoimportance, Or represents the status quo, or a no change situation condition that is local in importance (A2=1), and a slight change from the status quo (A2=1), yet is permanent (B1=3), irreversible (B2=3) and cumulative (B3=3), represents the upper limit of the 'slight change' condition.
A condition of 'change' will occur up to a condition of local importance (A1=1) with significant magnitude (A2=2), that is permanent (B1=3), irreversible (B2=3) and cumulative (B3=3).
A condition of moderate change will lie between the limits of change' and 'significant change'.
The lower limits of 'significant change' can be taken as the point when a condition is outside local boundaries (A1=2) but is of major importance (A2=3), yetis temporary (B1=2), reversible (B2=2) and non-cumulative (B3=2).
A 'major change' will occur at a point when the condition extends to a regional/national boundary (A1=3) and is of major importance (A2=3). Such a Change would also be permanent (B1=3), irreversible (B2=3), though it could be non-cumulative (B3=2).
Once the ES score is set into a range band, these can be shown individually or grouped according to component type and presented in whatever graphical or numeric form that the presentation requires. The full EIA report will detail the criteria used, the components derived after scoping, the RIAM matrix, and the presentation of the RIAM results – together with the normal baseline information, conclusions and suggested mitigation.

Range bands used for RIAM

Table.1 Range Values Of RIAM

RIAM Environmental score (ES)	Range value (RV) (Alphabetic)	Rangevalue (RV) (Numeric)	Description of range band
108 to 72	E	5	Major positive change/impact
71 to 36	D	4	Significant positive change/impact
35 to 19	C	3	Moderate positive change/impact
10 to 18	B	2	Positive change/impact
1 to 9	A	1	Slight positive change/impact
0	N	0	No change/status quo/not applicable
-1 to -9	-A	-1	Slight negative change/impact
-10 to -18	-B	-2	Negative change/impact
-19 to -35	-C	-3	Moderate negative change/impact
-36 to -71	-D	-4	Significant negative change/impact
-72 to -108	-E	-5	Major negative change/impact

The sensitivity of the ranges is still based on subjective definition of range bands. This does not permit more sensitive bands to be easily formed, and the present system may not be sensitive enough for use in marginal or fragile environments.

(Table). Experiment has shown that a +5-range band is as sensitive as can be developed for a 5-criteria matrix, and such a range band is shown in Table (with both numeric and alphabetic RV values).

IV. DATA COLLECTION FOR EIA:

Physical Impacts/Chemical (PC)	**Biological Impacts/Ecological (BE)**
1. Land Use 2. Landscape 3. Land Erosion 4. Landslides 5. Ambient Air quality 6. Ambient noise 7. Surface temperature 8. Vibrations 9. Geological changes 10. Water Pollution 11. Water Use 12. Radiation 13. Local climate 14. Storm water drainage 15. Topography	1. Deforestation/Devegetation 2. Biodiversity 3. Flora &Fauna 4. Natural Habitats 5. Aquatic fauna 6. Wild life and Birds 7. Natural resources 8. Global climate 9. Sewage disposal/sanitation 10. Solid wastes/disposal 11. Water bodies 12. Nature conservation 13. Disturbance from light pollution 14. Extant of habitats 15. Road kill

Social Impacts/Culture (SC)	**Economical Impacts/Operational (EO)**
1. Rehabilitation/Resettlement 2. Loss Of Livelihood 3. Loss Of Lives/Accidents 4. Housing/Infrastructure 5. Education/Training 6. Health Aspects 7. Health And Hygiene 8. Cultural Heritage(Tribal) 9. Tourism, National Parks, 10. Sanctuaries 11. Aesthetics 12. Electricity Facilities 13. Transportation Network 14. Traffic Intensity 15. Historic Buildings	1. Land value 2. Local area development 3. Housing/infrastructure 4. Financial 5. Development(state/nation) 6. Commercial establishments 7. Productivity of land 8. Employment/business opportunity 9. Uplift of standard of life 10. Business opportunity 11. Urban development 12. Land cost 13. Transportation facilities 14. Area development

V. RESULTS & DISCUSSION

The following are the input values taken from based on Google maps, Google earth images, and their parameter values. The parameters values taken based on table 1. After that we inserted these values in the RIAM software for the Mangalagiri, Tadikonda, and Chikkavaram. The results and values of this place are given below. From the comparisons of three places we identified the best suitable places is Chikkavaram.

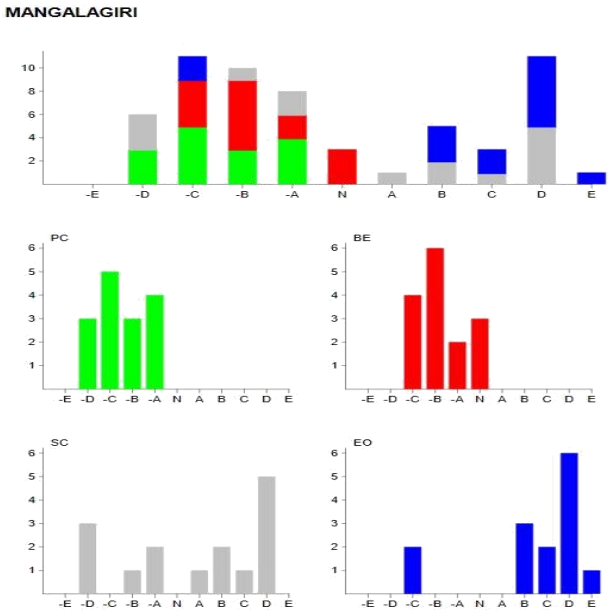


Fig.4. Scores for Option-1: Mangalagiri

Mangalagiri:

In Mangalagiri the physical/chemical impacts have the negative value of 15 and the neutral impact and positive impacts doesn't have any value.

In Mangalagiri the biological/ecological impacts have the negative value of 12 and the neutral impact has 3 and positive impact doesn't have any value.

In Mangalagiri the social/cultural impacts have the negative value of 3 and the neutral impact value is zero and positive impacts value is9.

In Mangalagiri the economical/operational impacts have the negative value of 2 and the neutral impact has zero and positive value has12.

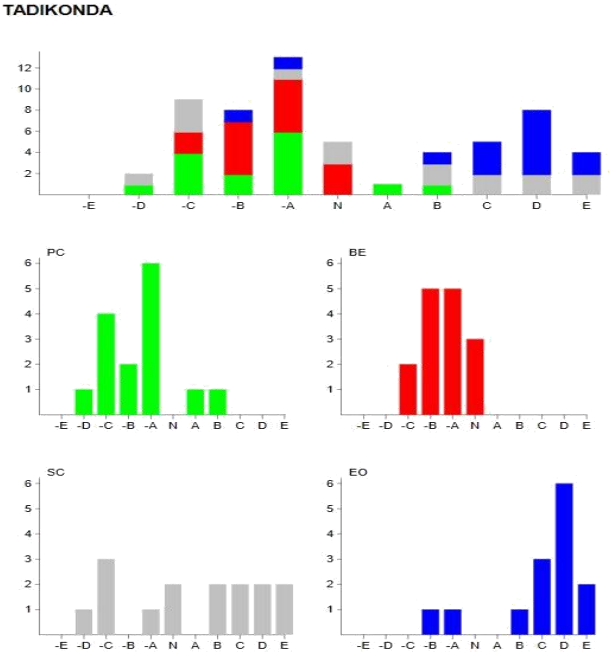


Fig.5. Scores for Option-2:Tadikonda

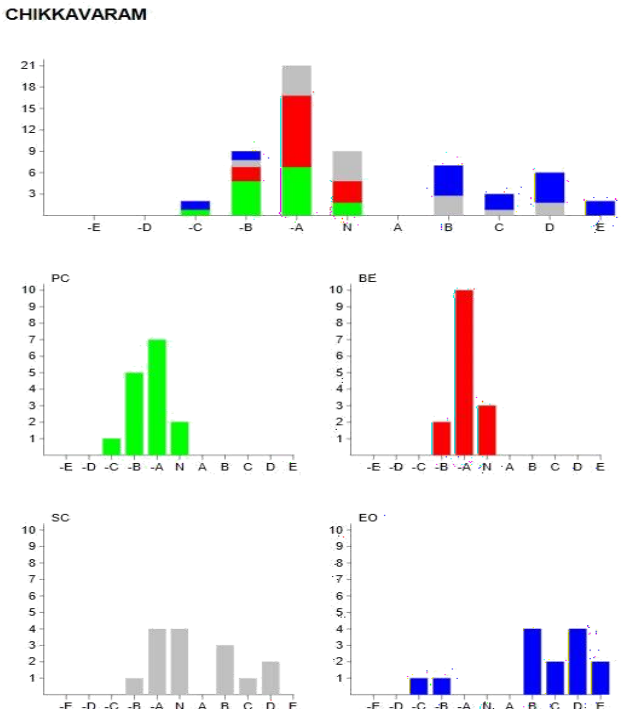
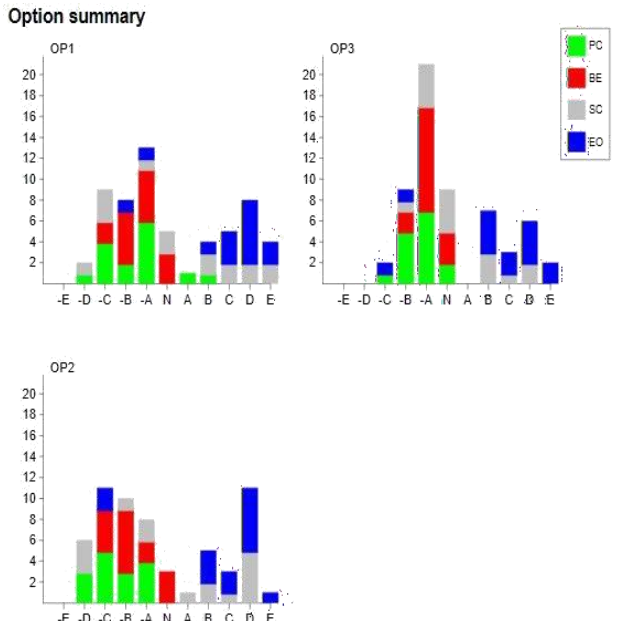


Fig.6. Scores for Option-3:Chikkavaram



Tadikonda:

In Tadikonda the physical/chemical impacts have the negative value of 13 and the neutral impact value is zero and positive impact value is2.

In Tadikonda the biological/ecological impacts have the negative value of 12 and the neutral impact has 3 and positive impact doesn't have any value.

In Tadikonda the social/cultural impacts have the negative value of 5 and the neutral impact value is 2 and positive impacts value is8.

In Tadikonda the economical/operational impacts have the negative value of 2 and the neutral impact has zero and positive value has12.

Chikkavaram:

In Chikkavaram the physical/chemical impacts have the negative value of 13 and the neutral impact value is 2 and a positive impact doesn't have any value.

In Chikkavaram the biological/ecological impacts have the negative value of 12 and the neutral impact has 3 and positive impact doesn't have any value.

In Chikkavaram the social/cultural impacts have the negative value of 5 and the neutral impact value is 4 and positive impacts value is6.

In Chikkavaram the economical/operational impacts have the negative value of 2 and the neutral impact has zero and positive value has12.

VI. CONCLUSION

We identified the unquotable parameter values and we quantified that parameters and gave values in RIAM software. The output values have some negative and positive values by that we noticed that Mangalagiri has the negative impact value is 32, neutral value is 3 & positive impact value is 21. Tadikonda has the negative impact value is 32, neutral value is 5& positive value is 22. And Chikkavaram has the negative impact value is 27, neutral value is 9& positive impact value is 18. From the above values Mangalagiri and Tadikonda will face environmental affect if there is construction of airport. So, we preferred that Chikkavaram is the best place and suitable for construction of an airport depending upon the environmental prospective

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