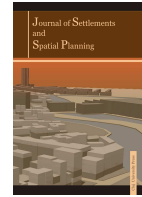




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Cluster Housing Concept. A Sustainable Site Design Approach of the Residential Subdivisions in the Municipality of Tuba, Philippines

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ABSTRACT

The significance of land consumption as a variable of sustainable development has made *residential subdivision planning concept* an important subject among the global environmental issues. The continued negative economic and social impacts of sprawl have resulted in calls for more sustainable subdivision designs; such type of design is the *cluster housing concept*. However, not much is known about this concept and in particular about its social values. This study was intended to evaluate the social and environmental impact of conventional subdivision concept in the Municipality of Tuba, located South of Baguio City, Province of Benguet, Philippines, and look at the adaptability and positive impact that an alternative concept such as the cluster type of approach could bring to the municipality and the environment. The results revealed that the respondents, both implementers and residents, agree on the factors that have triggered the growth of conventional subdivisions and the resulting negative impact on the environment of Tuba. Hence, the consensual agreement of the main reason causing environmental problems is lack of knowledge in sustainable planning and design principles. The results indicate that factors such as: sense of community, need and access to open spaces and outdoor activities are desirable aspects in the community. Considering these preferences in Tuba, the adoption of the “cluster housing concept,” which integrates sustainability and the holistic approach, is undeniably relevant and suitable.

1. INTRODUCTION

The study of land use consumption has recently become an important subject in studying social and economic dynamics of residential subdivision development in the global environmental issue. This statement puts in mind the balance that should exist between development and the protection of the environment to promote sustainable development. According to the UNDP 1996 Human Development Report and Philippine Agenda 21 section 1.2, growth is futureless when there is degradation of the environment, loss of biodiversity, loss of rights to the

natural resource base; and growth is rootless when cultural diversity and cultural values are lost, when production and consumption become excessive and when prevailing attitudes become materialistic [1]. Planning for development shall encompass all aspects, and it should not only focus on the economic, political, technical, but also on the physical and social aspects [2]. Being the catchment area of population the Municipality of Tuba overflows at present due to natural growth and migration in the City of Baguio; it is also a host to numerous subdivisions. More developers are eyeing this area due to its promising potential in terms of availability of sites, good environment, scenic views and proximity to the city of Baguio and to the

outlying towns and municipalities. The scarcity of available land in the city and the high cost of property are also some of the main reasons why Tuba is slowly being encroached by these subdivisions, threatening its existing and dominant land use which is mainly for agriculture and forests. The resulting effect of this is the continuous and rapid conversion of its land into residential use which does not only deprive people in the area of their agro-based industry, but also alter the land use and environment of this municipality.

These types of development are commonly characterized by a grid type or conventional concepts in subdivisions that are lacking sustainable site design approaches. In general, the only open space within such development has been the yards between adjoining properties, little planning going into preserving or improving the quality of the open spaces or protecting the natural features of the land. Current practices of subdivision developers indicate low regard to open spaces by locating these in areas inappropriate for passive and active recreations. Moreover, residential zoning ordinances and subdivision standards have encouraged conventional designs by requiring minimum lot sizes, uniform road frontage and lot setbacks, and specific road standards which failed to consider the protection and conservation of the adjoining agricultural and forest lands. Lack of knowledge and consideration in proper site planning and innovative design approaches plus the changing social values reinforce the problem. In contrast, the cluster housing concept for subdivision development with its unorthodox and promising features, once proven to be a better alternative, shall be further studied to determine its adaptability and workability in the Municipality of Tuba. Although still somewhat new in the country, this concept has been used for some time and proven successful in parts of the United States. The cluster housing concept is environmentally friendly, promotes preservation of the site's natural assets like the terrain, vegetative covers, promotes a better sense of community, improves the visual character of the site, gives variety to the landscape, and a setting that echoes the culture of the municipality. Since the cluster housing concept results in large open spaces that can be reserved for landscaping and preservation areas, it can serve as the "green lungs" of each site. Consequently, if all subdivisions have this life support system, it can greatly contribute to the maintenance of the municipality's unique climate and beauty and promote a balance between development and the environment.

It is along this vein that this study was undertaken to evaluate the sustainability aspects of the conventional subdivision concepts related to the alternative concept, which is the cluster housing concept. Since the impact of these concepts have significant relation to the three (3) Es of sustainability,

an evaluation will be conducted to determine its measure in terms of sustainability. Specific sustainability measures such as: compliance with existing zoning ordinances and subdivision standards, related environmental and land laws, sustainable site planning principles and manifestos, cultural and behavioural aspects relative to the innovative concepts shall likewise be considered to identify the social significance of such approaches.

2. A SHORT THEORETICAL OVERVIEW OF THE CLUSTER HOUSING CONCEPT

The concept of cluster housing development as a pattern of human settlement has been around for centuries. Cluster housing development also referred to as "conservation subdivisions" involves the grouping of residential structures in a subdivision on a portion of the available land. The intent is to develop less total land area to provide more open space for recreation or agriculture while allowing the same number of total housing units as it would have been allowed for a conventional subdivision. According to William H. Whyte, the author of "Cluster Development", the cluster housing concept was created as an alternative to the conventional subdivision. The first conscious application of this concept was in Radburn, New Jersey in 1928. Though it was based on English planning and Ebenezer Howard's Garden Cities movement, it used principles of cluster development. Following Radburn, many other towns in New Jersey applied those principles to their planning, notably the "village green" in Hillsborough, NJ and Brunswick Hill in South Brunswick.

Martin (2013) in their study regarding Henry Wright's "Radburn Concept" for some parts of the United States, observed the advantage of the cluster housing concept as a means to promote a more sustainable community evidenced by the higher percentage of open space compared to the conventional or Gridiron type of planning persistent during the early 20th century [3]. In response to the Radburn concept, planners, developers, and elected officials have created a number of tools designed to balance growth with the preservation of community environmental and financial assets. One tool that received an increasing amount of attention in the 1990's is the "cluster housing development" otherwise known as the "conservation subdivision."

The underpinning on how sustainable development and the cluster housing concept are linked was explained by Whyte (1964) in his five enumerations of the purpose of cluster development [4]:

- 1). To promote integrated site design that is considerate to the natural features and topography.
- 2). To protect environmentally sensitive areas of the development site, as well as to permanently

preserve important natural features, prime agricultural land and open space.

3). To minimize non-point source pollution through reducing the area of impervious surface on site.

4). To encourage saving costs on infrastructure and maintenance through practices such as decreasing the area that needs to be paved and the decreasing distance that utilizes the need to be run.

5). The primary purpose is to create more area for open space, recreation and more social interaction.

Blaine and Shear (1998) reinforced such purpose by explaining further the advantages of cluster housing concept [5]. According to them, this concept can maintain the rural character of the area, providing a sense of community among residents, cheaper site development costs involving road construction and utility provisions. These reduced costs often offset the costs of restoration or development of amenities such as trails on the open space areas. Other advantages include meeting a market need for low-maintenance housing and greatly reducing the impact of development on water sheds.

Acknowledging the fact that any concept of development has its advantages and disadvantages; Blaine and Shear (1998) recognized that one disadvantage of the cluster housing concept is that, in many communities, current zoning and subdivision regulations require conventional building patterns. This forces the developer to educate and convince local zoning boards to approve variances for a cluster housing development adding a potential time delay to the project. In the Philippines, as a case in point, national housing laws such as the Presidential Decree 957 [6] and the Batasang Pambansa 220 [7] have promoted more of the conventional or gridiron planning; in fact, upon examination of these documents little was mentioned in terms of its rules and regulations regarding the cluster housing concept. The second disadvantage of this concept is about the maintenance of open space which normally requires the formation of a homeowner's association and the assessment of maintenance fees to each subdivision lot owner to pay for taxes, insurance, and the general upkeep of the land in the open-space areas. This is a cost not typically incurred in a conventional subdivision since all of the land is privately owned. Another disadvantage of the cluster housing concept is the smaller-sized lots often resulting in close proximity of neighbours' homes and that are considered a disincentive to some homeowners. If the lots and housing layouts are designed carefully, each house in the subdivision has a private unobstructed view, and thus this disadvantage would be overcome. Unfortunately, some earlier cluster housing concepts did not provide very much open space resulting in a negative attitude toward this option in some communities.

Much of the criticism on the cluster housing concept designed during the 1960s and the 1970s is that they typically contain "only insignificant areas of common open space" [8]. Critics are also correct to point out that clustering has not been widely used among developers because local governments have either disallowed it or have made it more time consuming by classifying it as a conditional use or exception.

At this point, most of the physical components of cluster housing concept with both negative and positive impact have been discussed briefly. One element to this effect which requires equal consideration is its economic valuation. Rayman (2006) has concluded that the environmental benefits of less land consumption and growing interest regarding the negative economic and social impacts of sprawl have resulted in calls for more sensitive subdivision design like that of a cluster housing concept [9]. However, not much is known about this concept and in particular about its economics. Rayman's article addresses the issue by examining price premiums, investments cost, and absorption rates for lots in conservation versus those in conventional subdivisions. The results show that lots in conservation premium are less expensive to build and sell more quickly than lots in conventional subdivisions. It also suggests that designs that take a holistic view of ecology, aesthetics, and sense of community can assuage concerns about high density.

Conversely, the potential negative consequences of the cluster housing concept require further study. Related to Rayman's economic study is that of Bowman (2012), which has examined the consumer value for conservation and low-impact design features in one housing market by using four different valuation techniques to estimate resident's "willingness to pay" for Conservation Subdivision Development (CSD) and Low Impact Development (LID) [10]. Participants indicated that the clustered housing concept was favoured due to its natural amenities such as open spaces. Participants were not willing to pay for neighbourhood without buffers. Finally, a spatial hedonic price model indicated that the presence of neighbourhood-owned forest and water features as well as the proximity to public parks had significant positive effects on housing prices. Although the relative magnitude of value expressed varied, all methods indicated that residents value CSD and LID subdivision features.

The identification of sites for the cluster housing concept within a region, city or municipality has been debated by Arendt (1996) [11] and Kunstler (1994) [12]. Both agreed that community plans should identify which areas of the community are appropriate for this concept. Deciding which areas are high priorities for protection is important. Goals for the preservation of such spaces should be prepared. If the preservation of these lands can coincide with public use,

the community's plan could stipulate that open areas remaining after the cluster should be assigned to the public for park use. The local government would be responsible for maintenance of the open space. If the land were not to be used by the general public or were to be used for agricultural purposes, an alternative would be to give the land to a private land trust. Another alternative is that the open space be held in common by the individual homeowners who are part of the cluster development.

Ultimately, good site planning is an important component in reviewing the cluster or the conservation type of approach to development. It is important that the community properly evaluate this approach to development to ensure the layout of open space and the proposed placement of structures that is appropriate for the topographic, environmental, vegetative, and cultural features of the site.

Except for Whyte and Arendt, most of the studies have not considered formulating an evaluation criterion to be used as a basis of site selection criteria for the cluster housing concepts.

3. METHODS AND PROCEDURES

In general, the study sought to investigate the present status of conventional subdivision patterns and its effect on the land use and environment of the Municipality of Tuba, Province of Benguet. More specifically, the study attempted to look into the adaptability and positive impacts to the environment that an alternative concept like a cluster or conservation type of approach can contribute to the municipality. Considering that the study is focused more on the physical impact assessment of the conventional subdivision approach – we used the descriptive research method. Specifically, the evaluative type of survey and since the study is about looking into the commonality of elements; the normative survey was likewise adopted.

One of the initial approaches conducted were the determination of the current land use of Tuba and its surrounding environment. Data like Land Use Maps and other thematic maps proved significant in determining the impact of subdivision developments in the municipality. Identification of sensitive land uses like conservation areas such as forest and agricultural areas and their relation to trends or direction of residential developments will determine the degree of threat that would result in possible encroachments. Related visual survey instruments like photographs also proved significant to determine the present conditions and the subdivision development direction. Actual pictures of the existing subdivision projects were taken on selected sites to serve as basis for evaluation and analysis as to its sustainability in terms of site planning and design and its conformance to existing subdivision

standards like P.D. 957 (Subdivision Standards for Open Market Subdivisions) [6], B.P. 220 (Subdivision Standards for Socialized and Economic Housing) [7], P.D. 1586 [13], A.O. 42 (Philippine Environmental Impact Statement System). Moreover, the sustainable site design criteria formulated by Valdez, Arendt and Andropogon was also evaluated and used as basis. Data relative to the compliance of these subdivisions to standards as well as complaints relative to such developments were sourced out from the concerned government agencies related to housing, such as the office of the Housing and Land Use Regulatory Board (HLURB) and the Environmental Management Bureau (EMB) of the DENR and the local government of Tuba.

Data were transformed into a questionnaire-checklist type presented in tabular forms. Tables in the questionnaire indicated the parameters of sustainable site planning and design standards, the compliance status of these subdivisions, and other issues relative to such developments.

The stakeholders in this study were classified as: Implementers (subdivision developers, local government units, architects and engineers and related government and non government agencies) and the Residents (permanent and temporary). The sampling technique used was purposive sampling since the population selected was formed by those directly involved in the study. The respondents were chosen on the basis of their knowledge on desired information. Since the population was composed of varying compositions, we adopted the non-probability method of sampling. The population of the study consisted of fifty three respondents broken down as follows: twenty five (25) for implementers and twenty eight (28) for mixed residents from Barangay Tadiangan and Tuba.

The use of questionnaires served as a supplemental tool to substantiate and justify the other tools used in this study. It sought to attain responses dealing on relevant aspects related to sustainable development specifically, compliance to subdivision standards, site design aspects, economic, socio-cultural and behavioural aspects among others. Resultant data were presented, analyzed and evaluated using the mean method. The use of this method will simplify and provide answers to the questions or statements being sought in this study. To measure the level of agreement relative to varying aspects and concerns in the study, the weighted mean in each aspect of the responses was computed and to arrive at a definite conclusion for the computed weighted mean, the researcher used a quantitative scale value.

Parameters used for sustainability were the Valdez Principles for Sustainable Site Design and the Austin Sustainable Communities Initiative. The above parameters are common tools used in foreign countries to measure the sustainability of a certain development project. Sustainability aspects derived from the

subdivision standards such as P.D. 957 and B.P. 220 were combined with the above principles to form part of the significant aspects that are to be incorporated in the questionnaire. Moreover, the behavioural aspects as one of the components of the questionnaire determined the emotional responses of stakeholders to space, their preference and perceptions.

The problems addressed in this study are the following:

- 1). What are the factors which brought about the prevailing conditions and practices of conventional subdivision developments and its resulting impact to the land use of the Municipality of Tuba?
- 2). How does the conventional subdivision concept measure up to a sustainable type of development in terms of:
 - 2.1. Planning and design aspects.
 - a). Environmental aspects.
 - b). Economic aspects.
 - c). Equity.
 - 2.2. Subdivision standards and Environmental regulations.
 - 2.3. Socio-cultural aspects.
 - a). Heritage value.
 - b). Quality of life.
 - c). Sense of community.
 - 2.4. Behavioural aspects.
 - a). Sense of place.
- 3). How can the cluster housing concept as an alternative site planning and design approach in subdivisions contribute to the attainment of a sustainable type of development to the Municipality of Tuba?

4. PRESENTATION OF FINDINGS

With the end view of introducing concepts related to a balance approach between the preservation of the environment of Tuba and its future development, this study was conducted to establish the need for improvement in current subdivision planning and development, and the adaptability of an alternative concept such as the “Cluster housing concept” in the Municipality of Tuba.

The need for improvement was evaluated along the dimensions of the environmental impact related to the conventional subdivisions of the land use in Tuba, the prevailing conditions and practices of conventional subdivision developments, its sustainability and its degree of compliance to subdivision standards and sustainable site planning principles. The nominated dimensions were evaluated by stakeholders classified as the “implementers” and the “residents” of the area. Responses from these stakeholders were determined by getting their means, the results of which were derived from the comprehensive analysis of photos, plans, documents,

and maps. The corresponding results were also corroborated by the findings through written documents sourced from different research materials.

The applicability of the study was evaluated along the dimensions of sustainable aspects in terms of planning and site design principles and the socio-cultural aspects with subsystems in terms of heritage value, quality of life, sense of community and sense of place. The significant findings are the following:

4.1. Degree of agreement to the factors that led to the growth of subdivisions and the sustainability aspects of traditional subdivision development

4.1.1. The land aspects

In terms of the first question regarding the factors brought about the prevailing conditions and practices of the conventional subdivision developments and its resulting impact on the land use in the Municipality of Tuba, results showed that both implementers and residents significantly agreed that the availability of vast tracts of raw land that were at the same time affordable, coupled with the prevalence of conversion from agricultural to residential purposes, was prevalent in the municipality.

The overall mean of responses on this dimension was on the scale of 2.64 to 3.34 which fell on the qualitative description of strongly agree and agree, respectively. The slight difference between responses is due to the fact that implementers are technically oriented and more exposed to subdivision projects.

The above observations are corroborated with the existing land use map of the Municipality of Tuba (fig. 1) and it is evident that subdivision developments proliferated especially in Tadiangan, Taloy Sur, Taloy Norte, and Poblacion.

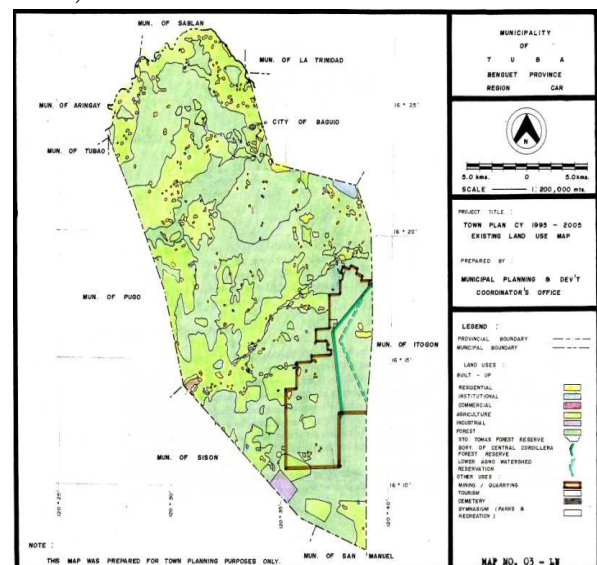


Fig. 1. Existing land use map of Tuba on the location of subdivision.

These areas are notably close or located along the stretches of Marcos Highway and Naguilian Road. The attraction of lower cost raw land which proved viable for large scale development and the variety of visual amenities that the landscape of Tuba can offer (e.g. panoramic views and expansive greeneries) resulted in a dramatic increase in the conversion of agricultural land to residential uses.

Reinforcing this dualistic development is the

map showing the tourism sites and potential site for development (fig. 2) which gives Tuba the added attractions that lure investors and developers of subdivisions in the municipality of Tuba.

It is also evident from this map that the locations of potential tourism sites which are well within the possible expansion areas of residential uses could create conflict with the existing and future land use plan of the municipality.

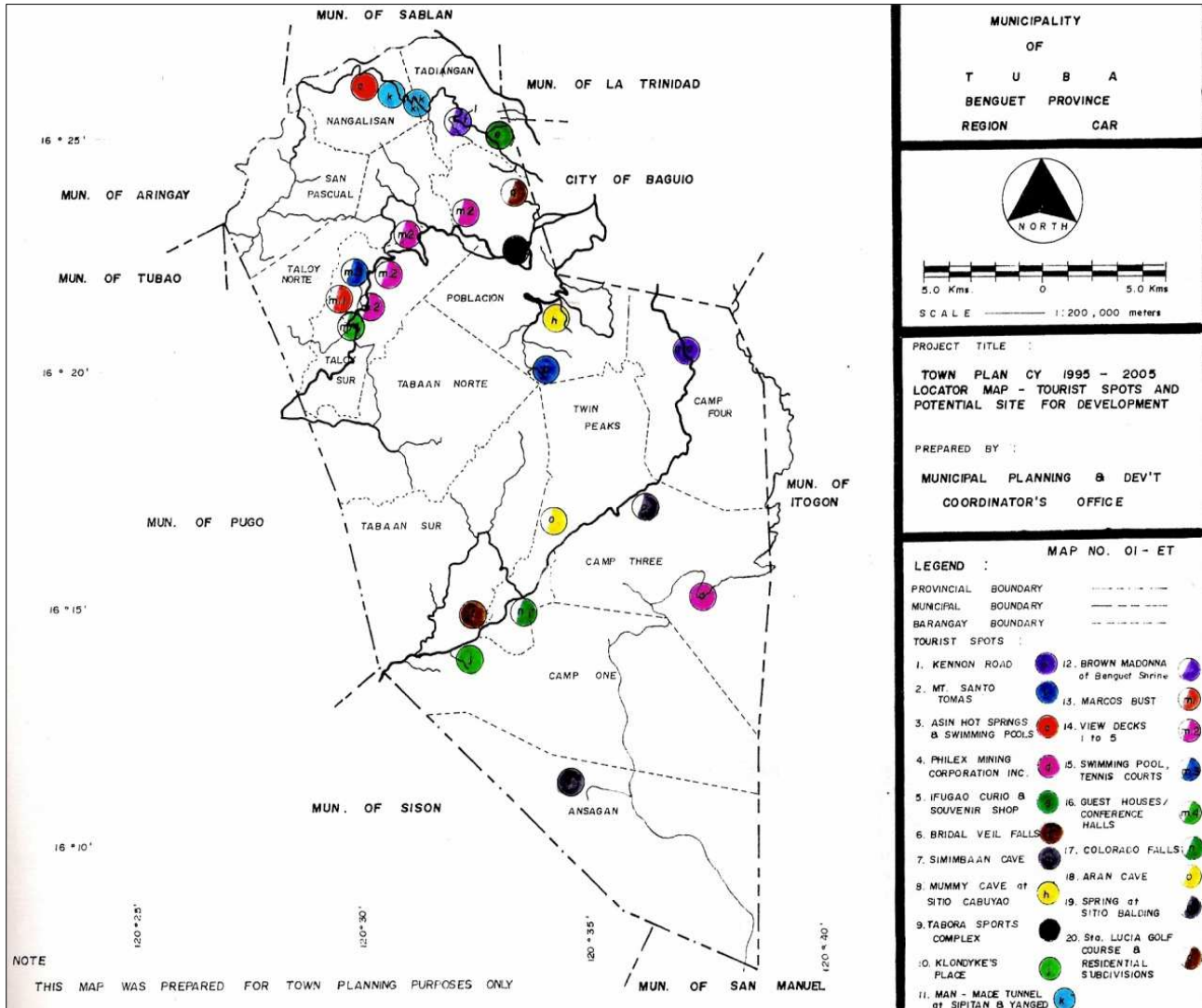


Fig. 2. Tourism sites and potential site for development in Tuba.

Likewise, both respondents are in agreement that these developments have created a significant impact on the land use and environment as manifested by the visual surveys and photos conducted which indicate that these developments resulted into a significant fragmentation of the landscape in Tuba, altered the natural terrain through massive earth moving, cutting of trees and disturbance of existing vegetation, and siltation of rivers among others (fig. 3).

These were reflected in the responses from the questionnaire and the data taken from the monitoring section of the Environment Management Bureau of the Department of Environment and Natural Resources.

4.1.2. Subdivision planning, housing benefit and political aspects

Relative to the measure of housing benefits, both respondents - implementers and residents - synonymously agreed that profitability is not measured by the maximized number of saleable lots at the expense of open space with means of (2.96) and (2.46), respectively and has an adjectival value of "moderately agree." On the issue of effective leadership and political will as a significant factor in the attainment of balance between development and environmental protection, results indicated that implementers "strongly agree"

(3.44) and residents “moderately agree” (2.82). This means that effective leadership is an important ingredient in the attainment of the above factors.

4.1.3. Environmental aspects

In terms of the environmental aspects of conventional subdivisions, results indicate that implementers “moderately agree” with average mean of 2.52, and residents “agree” at 2.18 that conventional subdivision patterns cause fragmentation of the landscape in Tuba and do not promote spiritual harmony. According to respondents’ observations, conventional subdivisions increased land slide and soil erosions in the municipality causing further siltation of

natural water ways due to massive earth moving and alteration of terrain. Based on the “Valdez Principles for Site Design,” no site can be understood and evaluated without looking outward to the site context, which means that fundamental questions must be asked in light of its impact on the larger community. On the issue of environmental impact from the conventional subdivision developments, an interview conducted with Engr. Tandy Paquit of the E.I.A., division of the Environment Management Bureau stated that the common complaints associated with these subdivision developments dealt on siltation of rivers and damage to crops. Such problems are evident along the area of Taloy Sur and Norte, as far as the municipality of Pugo, La Union.



Fig. 3. Negative impacts of conventional development to the environment.

4.1.4. Economic aspects

Results indicated that the lack of sustainable approaches to subdivision developments results in expensive site development cost, road and storm drainage maintenance and management, lower appreciation cost with the absence of natural site elements like trees, grass cover, etc. and offers lower benefit in terms of long term social and environmental costs and quality of life.

According to Arendt (1996) the Cluster or Open space type of developments can be significantly less expensive to build than conventional subdivisions [11]. Most of the cost savings are due to savings in road

building and storm water management conveyance costs.

The factor that commonly affects the cost of saleable lots or house and lot in subdivision is the “sunk cost” or the capital outlay cost which, when excessive, would certainly increase the selling prices. With a benefit lower cost of development through the adoption of a sustainable concept, developers can come up with better prices which can be more affordable to the middle income group of the community.

Studies have shown that proximity to protected open space and the provision of some basic recreational facilities enhances residential property value.

Table 1. Degree of agreement to the factors that led to the growth of subdivisions and the sustainability aspects of conventional subdivision development according to land, political, environmental, and economic aspects.

Indicators	Implementers		Residents	
	Mean	VI	Mean	VI
A. Land Aspects				
1. Lower cost of raw land attracts subdivision developers in Tuba	3.16	MA	2.71	MA
2. Tuba has large tracts of land feasible for subdivision development	3.20	SA	2.71	MA
3. Subdivision development has a significant impact to the environment of Tuba	3.28	SA	2.61	MA
4. Unabated subdivision development encourages conversion of agricultural land use to residential land use	3.28	SA	2.54	MA
Area Mean	3.23	SA	2.64	MA
B. Subdivision Planning, Housing benefit and Political Aspect				
1. Knowledge and application of sustainable site planning is significant in subdivision planning and designs.	3.64	SA	2.86	MA
2. Profitable measured in terms of maximized no. of saleable lots at the expense of open space is not the true measure of housing benefit	2.96	MA	2.46	MA
3. Effective leadership and political will is needed in the attainment of balance between development and environment protection in Tuba	3.44	SA	2.82	MA
Area Mean	3.44	SA	2.71	MA
C. Environmental Aspects				
1. Conventional subdivision patterns cause fragmentation of the larger landscape	2.88	MA	2.18	A
2. Conventional subdivision does not promote spiritual harmony and embody an ethical responsibility to the native landscape and its resources	2.36	A	1.82	A
3. Conventional subdivisions cause environmental impact to the larger community	2.60	MA	2.18	A
4. Conventional subdivision does not preserve sensitive lands prone to erosion and slides	2.52	MA	2.25	A
5. Conventional subdivision does not provide a conducive environment for the propagation of plant and animal communities	2.64	MA	2.11	A
6. Conventional subdivision does not promote the protection of the agricultural and forest areas from encroachment of residential areas	2.36	MA	2.14	A
7. Conventional subdivision development causes situation of natural waterways due to massive earthmoving and alteration of terrain	2.28	A	2.64	MA
Area Mean	2.52	MA	2.18	A
D. Economic Aspects				
1. Conventional subdivision development on a sloping site is expensive in terms of site development costs.	3.20	SA	1.96	A
2. Conventional subdivision offers opportunity for hiring of local labour within the municipality where it is situated.	2.84	MA	2.07	A
3. Conventional subdivision is expensive in terms of road drainage maintenance management (ex. Road networks, storm drainage systems, security, etc.)	2.96	MA	1.89	A
4. Conventional subdivision does not allow the natural ecosystem to be self-maintaining to the greatest extent possible	2.56	MA	2.39	A
5. Selling prices of lots in conventional subdivisions appreciate slower with the absence of natural site elements like trees, grass cover, etc.	2.64	MA	1.96	A
6. Conventional subdivision offers lower benefit in terms of long term social and environmental costs, quality of life.	2.40	MA	2.04	A
Area Mean	2.76	MA	2.05	A

Symbol: (VI) Verbal Interpretation: SA (Strongly Agree), A (Agree), MA (Moderately Agree), D (Disagree).

This suggests benefits that can transcend even a significant reduction in house-lot size; the design flexibility inherent in an open-space layout leaves room for integrating the undeveloped lands into and around the groupings of structures. This ensures ready access to considerably more open land than would be possible on a given, albeit larger residential house and lot. Studies show that the prioritization of open space design techniques in a residential subdivision can provide cost savings of roughly Eight Hundred Dollars per home [14]. Other studies demonstrate infrastructure savings from 11% to 66%, once proper

clustering and open spaces are comprehensively analyzed and applied.

4.2. Degree of compliance of conventional subdivision designs and development to subdivision standards and sustainable site planning principles

Both respondents clearly indicate that the degree of non-compliance of conventional subdivisions to subdivision standards in terms of storm water drainage systems and alteration of natural water

courses is extensive. The above results were indicative of the existing features of conventional subdivisions characterized by extensive paved areas occupied by streets resulting to impervious surface areas.

This feature is the common cause of flooding in subdivisions due to the fast in-rush of high volume of storm water, the lack of pervious surfaces and collection ponds exacerbated the situation.

The above statements were attested by Arendt (1996) when he quoted that the lack of previous surfaces in conventional subdivisions has resulted in the reduced flow rate of water, but not the increased volume. He further emphasized that "cluster" or "open space" subdivisions with its ample areas of open spaces does not only reduce the volume of runoff but also cleans the storm water during the infiltration process.

This process also helps recharge the water aquifer. Related to this, Meffe (1997) observed that natural means of storm water drainage in cluster housing developments like the employment of grass swales instead of concrete curbs and gutters as commonly found in conventional subdivisions, result to more water infiltration and proves less costly in terms of development cost on the side of developers and lesser maintenance cost on the part of the home owners' association [15].

4.3. Degree of agreement on the socio-cultural and behavioural aspects associated with conventional subdivision development

Under socio-cultural aspects, results indicated that respondents "moderately agree" (implementers), and "agree" (residents) to the traditional subdivisions that do not promote local culture and indigenous architecture, a sense of identity or uniqueness that is different from other subdivision sites; and conventional subdivisions do not create a self-sustaining community. History indicates that the conventional subdivision patterns have their origin in suburban planning by the Americans.

They are characterized by grid layouts composed of saleable lots and road networks that give it a monotonous character and one that lacks a sense of place or community. Moreover, their layout does not satisfy the criteria for a holistic sustainable approach to development which according to Einsiedel (2003) [16] and Arendt (1996) shall preserve culture and promote community values and improve the quality of life.

Based on the Comprehensive Land Use Plan of Tuba Municipality, past and present private residential developments of the local townspeople follow the cluster pattern.

This is due to cultural and ethnic orientations where local people of Tuba tend to build in clusters due to close kinship, economic and social reasons, in simple terms, they group themselves for financial assistance

and resource augmentation as the need arises. This scenario conforms to the principles of sustainable design. It justifies that by respecting local environment and culture of the place, this would also redound to a community with a distinct identity and sense of place. According to Kunstler (1992), the sense of place is attained in the community if an environment is legible and it makes it easy for you to find places that you never visited before [12].

Antoniades (1986) went further by saying that a community and its environment had identity if it possessed a unique character, the concept of "identity" being directly related to "imageability" [2].

In terms of behavioural aspects, results show that respondents' preference to open spaces according to priority revealed that the children's play area is ranked first with (29) or 54.72%, followed by gardening at (18) 33.96% , then outdoor dining/picnic at (4) 7.55% and ranked last is drying yard at (2) 3.77%. This is indicative of the peoples' desire to have open spaces in their community.

It also manifests that outdoor family activities are priorities in their use of open space, the last one being used for utility purposes. Furthermore, as to the preference on the need for open space; results showed that open space with trees and vegetation is the only preference at (53) 100%, with 0% preference for open space with no trees and vegetations.

5. CONCLUSION

The result of the study reveals that factors that have led to the growth of conventional subdivisions and its resulting negative impact on the environment of the Municipality of Tuba was mainly determined by the availability of vast tracts of raw land that are affordable.

Conversion from agricultural to residential land use is prevalent and knowledge and application of sustainable site planning principles consistent with the geographical, political, economic and socio-cultural factors is significant in terms of providing balance between sustainable land use and environment.

The conventional or gridiron type of approach to subdivision planning and development has lacked sustainability which poses threat to the environment. Current practices in planning and development likewise reveal the lack of knowledge in sustainable planning principles as evidenced by the lack of compliance to existing subdivision standards and environmental laws.

Based on findings, socio-cultural factors like the sense of community, the need and access to open spaces and outdoor activities are desirable aspects in the community. Considering these preferences and with the need to attain a sustainable type of development, the adoption of the "cluster housing concept" which integrates sustainability and a holistic approach is undeniably relevant and timely.

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