

# On human progress through a time-resource-response-schema

Inaugural Lecture

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## 1. Salutation

The Campus Rector, Vice-Rector-(Teaching, Learning & Quality Assurance), Vice-Rector-(Research and Planning), Campus Registrar & Other Principal Officers, Dean of FAST & Deans of other Faculties, Distinguished Fellow Professors, Members of Campus Senate, Academic & non-academic colleagues, Invited Guests,. Students, Ladies & Gentlemen.

## 2. Preamble

I am most delighted to stand before you on this occasion to deliver my Inaugural Lecture in recognition of my promotion to the rank of full professor: Human Geography & Environmental Science in 2015 by the North West University, South Africa. It is an opportunity for me to talk about my *academic life* and to *share ideas* in my path of *scholarship*. I am most grateful to my parents for raising me and for providing emotional and material support. To my loving wife and children for their understanding. To my greater extended family which remains a source of support. To my friends and colleagues near and far who deserve a special mention on this occasion. To my students who remain a source of delight in my interactions with them. To my fellow researchers, supervisors and collaborators who make life quite interesting. Madam Rector, I am honoured to have been given the opportunity to serve this university.

## 3. Introduction

### 3.1 History of human progress

The concept human progress conjures up different images depending on place and context. For some, it captures the evolution of humans from marine organisms. Here, human progress becomes simply a *biological process* tracing back to about 200 000 years ago when the first anatomically modern human evolved in Africa. Others see human progress as a record of human

improvements in the last 1000 or so years. This makes it a *historical process*. For some, it describes across history what humans have been able to invent and use. Here, human progress becomes a measure of creativity, innovation and *technological development*. Yet, other see human progress in terms of the extent humans have succeeded in developing institutions, structures and systems that provide law, order, safety, governance, security, human rights and a better world for sustaining human lives. Here human progress becomes an *integrated socio-economic process*. It becomes a measure of *modern civilisation*. Caution is called for here, because the term “civilisation” has been in the past used as a tool in furthering discrimination in many parts of the world. For this lecture, I combine these four dimensions because any attempt at separating them would undermine the very thesis of this presentation.

### **3.2 The basic platform**

We can look at human progress from a multiplicity of angles. In terms of scale, from continents, to geographical regions, economic blocks, countries, provinces, districts, counties and sub-counties. There are variations in the nomenclature for administrative units from country to country. With reference to decision-making units (DMS), human progress may be studied with reference to the cumulative contributions of the public sector, state institutions, different economic sectors, individual firms, organisations, households and individuals. Given my background in geography and environmental science, the spatial perspective- hereafter reduced to SP and the process-induced perspective –hereafter abbreviated to PP, The two perspectives will inform the way the world around us is seen and interpreted. Since countries are *economic, political and organisational* units with a significant array of national statistics covering the indicators critical in human progress, I wish to approach HP at this scale. This does and will not negate references to smaller and larger geographical areas in the process. It will also not negate the appreciation that states are not homogenous in population composition, structure and level of progress. In line with positivist science, to which I subscribe as a paradigm, the rest of the lecture is built on the understanding that we need to understand the world around us if we are to initiate interventions that create sustainable synergies between humans and the environment.

### **3.3 The Central Challenge**

The central challenge at issue is what does SP and PP jointly offer that increases our understanding of the complex set of process-induced behaviour change that lead to human progress today? In short, how does the interaction of the spatial and process perspectives provide insights on human progress? To address this challenge, we need first to understand the conventional dynamics of each of the two dimensions.

### **3.4 Basic Concepts**

For purposes of clarity and focus, therefore, at the nation state level, human progress is a process<sup>[1,2]</sup> that describes the results of a set of interacting, imbedded and measurable inputs that cumulatively define positive interventions over a sustained long-term period to generate higher living standards<sup>[3]</sup> for the resident population. From this standpoint, human progress is not accidental but a product of deliberate interventions across time at various scales. Such interventions are often in the form of policy, planning and practice<sup>[4]</sup> and the setting up of functioning integrated public institutions <sup>[5]</sup> that safeguard the rights of individuals and create space for creativity, inventions <sup>[6]</sup>, entrepreneurship <sup>[7]</sup>, freedom and enterprise. People are at the centre of these developments in behaviour that it is possible to measure the reality of human progress. To stay clear of controversies centred on the problems of measurement<sup>[8]</sup>, the concept “human progress” will be used consistently throughout this lecture.

Interest in human progress cuts across social science, the humanities, natural science and applied science. Mention of human progress conjures up mental images of better standards of living, relative comfort, healthy life styles, balanced diet, high standards of public health, education, clothing, employment, housing and access to public utilities. All humanity aspires at differential rates towards some form of improvement <sup>[9]</sup> but this varies across countries and constituent regions. Our understanding of the concept is however not universal but variable depending on background education, training, discipline, place, time and socio-economic climate. Progress is presented as relative in time and space: the same applies to such generally widely used concepts as backwardness <sup>[10]</sup> modernization<sup>[11]</sup> and poverty<sup>[12,13]</sup>. Development<sup>[14]</sup>, as a concept, is too general to equate “progress” though the related concept of “economic development”<sup>[7]</sup> or even to the more constrained concept of “economic growth” [2] comes close to capturing a significant percentage of indicators generally used in measuring human progress <sup>[9]</sup>. Note for example the

absurdity of the terms: developing countries, developed countries, least developed countries while in fact, development itself is no more than a continuous process of cumulative change!!.

Human progress as a concept includes but is not limited to :

- the status of institutions,
- the state of institutionalised freedoms,
- the freedom of speech,
- the freedom of movement and
- the freedom of association,
- the state of business climate,
- how happy the citizens are,
- the state of social services and access thereof,
- the state of bulk infrastructure and,
- the ease with which people are able to live comfortable, fulfilling lives.

While the natural and applied sciences in general have been at the forefront of creativity and innovation in responding to human needs and wants, sharp variations arise when we scrutinize the performance of individual disciplines in the last two hundred or so years. Geography- which is over 200 years old has not been particularly aggressive in generating cutting edge research that revolutionizes the way the world operates. Instead, geographers, beyond coining several popular concepts-central place theory, distance decay- have tended to remain and operate in the comfort zone of academia- as followers in general. The same judgment, though cannot be made of environmental science, which, in a short space of time since 1975 has had an almost revolutionary impact on the way people look at planet earth and its future. Put together, geography and environmental science have something to offer to humanity and to generate critical insights on the processes that underlie human progress. Underlying this assertion is the general expectation that every discipline or part of, should make a direct or indirect contribution to some aspect(s) of human life and existence. It is in this context of relevance and applications that I wish to delve into insights of geography and environmental science in our understanding of human progress today.

### **3.5 Theoretical Context**

Assume a definable geographical area, as country ( $x$ ) with a known gross domestic product GDP( $y$ ), population ( $p$ ), income per capita ( $z$ ), human development index ( $h$ ) at a particular time ( $t$ ); then, HP is a result of a set of changes in ( $y$ ), ( $p$ ), ( $z$ ) and ( $h$ ) across ( $t$ ) at different points (1) and (2).

$$\text{Human development across } t_1 \text{ and } t_2, z = \frac{y}{p} \dots \dots \dots (1)$$

But human development index, ( $h$ ) is linked to three imbedded inputs: life expectancy (LEI), education (MYSI) and ( $z$ ). This relationship is such that it cannot be expressed in a single notation as in expression (1). Given that ( $y$ ) and ( $p$ ) generate ( $z$ ) and that HDI is also a measure of HP, two scenarios in theory describe changes in HP:  $h, z$ . where,  $p$  can be eliminated and simply expressed as change in  $z$

$$\text{Human progress, } HP_{t_2-t_1} = \Delta z \dots \dots \dots (2)$$

$$\text{Human progress, } HDI_{t_2-t_1} = \Delta h \dots \dots \dots (3)$$

But for any given period, the economy may register either negative (-) or positive (+) or a mix of the two. If so, HP is registered when there is a sustained growth in the value of either ( $z$ ) or ( $h$ ) or both. Underlying this expression (3) is the assumption that the rates of positive growth in GDP should, ideally, be greater than the rate of population growth. Otherwise, change in ( $z$ ) will be eroded by change in ( $p$ ) leading to a stagnant growth in ( $HP$ ). Human progress therefore is a product of variable events across time and location.

**3.6 The SP dimension**

As a discipline, the SP is an overlap between the social and natural sciences. It addresses the *what, how, when, where and why* of phenomena. It's traditional concern cover location, distribution, processes, scale and pattern<sup>[14]</sup>. But these concerns are not unique to the discipline. Hence, we reduce these to *what is where and why*. The SP studies phenomena, events, features, patterns and objects through time and space. The physical component of SP deals with interactions along the land-water-atmospheric interface and the imbedded processes that drive change thereof. The human component deals with people, settlement, location, resources, services, infrastructure, activities, organisation and how interactions ultimately generate distinct land use patterns<sup>[15,3]</sup> (socio-economic landscapes <sup>[16]</sup> across space. Like other disciplines, the evolution of the SP in the last 200 or so years has witnessed the periodic dominance of certain schools of thought: from environmental determinism, <sup>[17]</sup>, positivist science<sup>[18]</sup>, structuralist

geography to quantitative revolution, behavioural geography<sup>[19]</sup>, modernist geography and post-modernism. These have tended to coincide with similar eras in the evolution of knowledge across history, politics, economics, literature and philosophies of science. Today there still exists lively debates, at least in human geography about what methods of enquiry should be appropriate. The underlying philosophy of science meant that the need to identify a knowledge segment in terms of content demanded that practitioners specify what they wanted the discipline *to be* and how the discipline *actually operated*. Today, remnants of these schools, each with a fairly well developed theoretical platform exist side-by side in the pursuit of knowledge generation. The only constant that applies at any point in time-space is change <sup>[20]</sup>. The SP therefore studies a continually changing reality except that the time span (read distance) is in terms of thousands and often millions of years for events in the physical branch (in line with its closeness to physical geology), to unravel while in the human branch, our particular concern today, change occurs over shorter time periods. As a discipline, the SP allows for overlapping content with:

- agriculture,
- chemistry,
- information technology,
- demography,
- development studies,
- ecology,
- economics,
- public health,
- politics,
- transportation,
- geology,
- hydrology,
- meteorology,
- hydrology,
- water resources,
- surveying,
- oceanography,

- rangeland science,
- geomatics,
- geoinformatics,
- wildlife science,
- tourism studies,
- logistics and supply chain management,
- public management,
- physics,
- mathematics,
- statistics,
- urban & regional planning,
- land use planning,
- natural resource management,
- biodiversity and,
- environmental science.

Today, SP goes beyond the limitations of identity, location and distribution to build a body of knowledge around notions of time, space and scale through a focus on the spatial perspective. In recent years, developments in *geographical information systems* (GIS) [20] and in *remote sensing*[21] have seen a high level of sophisticated mapping and land cover change techniques that overlap with such related disciplines as geomatics[22] and land surveying. On the social scene, SP is increasingly delving into issues of social segregation, urban social spaces, territorial identity, rural-urban transitions and boundary demarcations. Increasingly, the SP is able to talk to issues of population planning and the sustainability of nation states. Flirtations with the so-called “*new economic geography*” [NEG] essentially an injection of new blood into human geography from mainstream economics [23,24], that present new perspectives on industrial location, industrial spillovers and the economics of agglomeration have not had a radical impact on mainstream thinking, at least in South Africa and Africa, perhaps partly because of the techniques imbedded in this approach.

The break-up into specialized departments of physical and human branches has been in place for decades initially at European universities. This development has advantages and disadvantages as the unity of the discipline is often threatened<sup>[25]</sup>. In the long run, systematic cannibalization of the discipline into specialisations have tended to expose the discipline to further erosion through the emergence of hybrid sciences some of which eat at its core content. Hydrology, water resources and natural resource management- to mention just a few examples. In spite of these, SP today remains perhaps the widest body of knowledge. So long as those who practice the discipline or parts thereof, remain guided by the *spatial perspective*<sup>[26]</sup> as an approach, overlapping *content* and *methodology* should in fact be seen and welcomed as offering opportunities for cross fertilization. Indeed, the resilience of SP is seen in the capacity of practitioners to participate in multi-disciplinary research teams that bring together inter-twined competencies. But caution is called for here. The subject content of the SP has over the years become so conventional across quite a number of disciplines in the natural, applied and social sciences that the SP claim over certain mainstream concepts is becoming unsustainable. Geography can no longer claim a unique content: this is already history.

### 3.7 Contribution of the Spatial Perspective

What does the spatial perspective offer?. A comprehensive *battery of techniques, protocols and skills* that allow an integration of location, scale, distribution, variability and land use change in time and across time as a basic platform for understanding the multiplicity <sup>[27]</sup>, complexity and competing forces of nature and social spaces to generate a diversity of human landscapes across space.

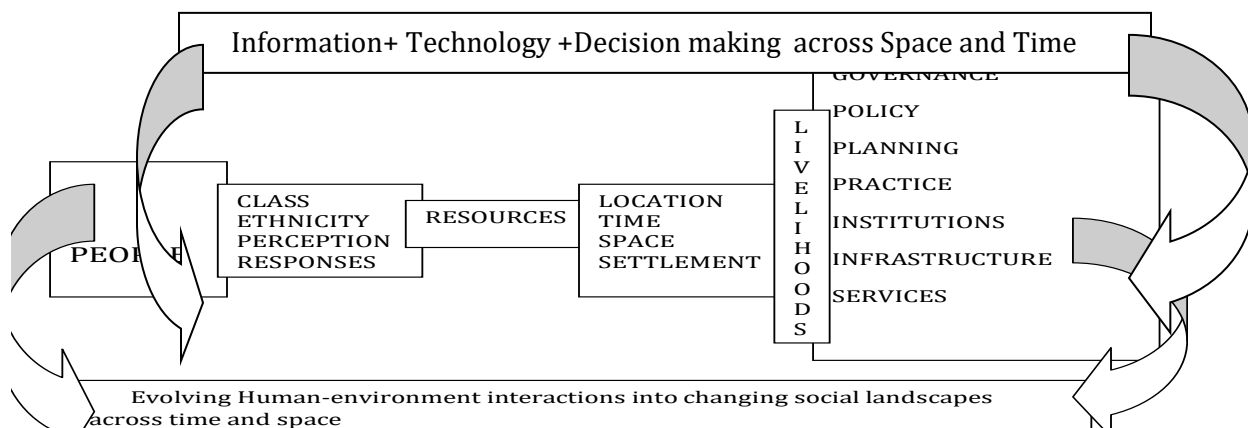


Figure 1. The context of human geography today



At a second layer of information, SP offers the bigger picture in the way it looks at, investigates and analyses complex interactions in time and across space-Figure 1. It is not far-fetched to claim that today, no other science offers such a comprehensive coverage of often competing forces simultaneously.

### **3.8 The Process Dimension**

The PP which is predominantly housed in the natural sciences, is a relatively young discipline [30] concerned with nature and how its evolution, through time is controlled by a multiplicity of variable anthropogenic and natural processes [28] that eventually determine the type and quality of ecosystem services [29] that it provides across time and space. Concern ultimately...through conservation, regulation, restoration (ideal), legislation rehabilitation, remediation and reconstruction is on safeguarding the sustainability of this environment in the face of increasing pressure generated by such drivers as urbanisation [14], industrialization and commercial resource exploitation [30]. The central focus of PP is on process dynamics across time and location and how they interact to generate particular climate-soil-topography-vegetation-water-mineral combinations that form the basis of ecosystems and biodiversity. Unlike the SP, the PP approaches and studies the world as a set of inter-related systems whose components are perpetually tending to the stable state. The stability of this natural state is threatened whenever any process dynamic is interfered with. When such occurs, natural forces have an inbuilt capacity for corrective interventions. Such corrective action requires time, often in hundreds and thousands of years. Rehabilitation, remediation and restoration are particularly concerned with such interventions.

What makes the PP different from the SP is its point of departure; process-induced behaviour in the context of systems at various scales. Departing from common approaches locally and beyond, I wish to present the SP (read geography) and the PP (read environmental science) as two distinct disciplines [31]. I stand by this position, in spite of contrary views locally and beyond in academia which appear to create the impression that PP is part of geography or that SP is no more than an extension of PP. This position does not negate the fact that the two are related; as, both deal with the environment. But being related in terms of sharing or overlapping subject matter is not necessarily similar to being the same and one in all. In any case, today, we

appreciate that all disciplines are related. This is inevitable if we are to comprehend the totality of knowledge.

Time and space or simply time-space as a concept need to be explained briefly because it represents a common quantity which in the context of SP and PP, attain a different and radical ramification. Time in this context is not just duration; it provides the opportunities for all activities to unfold. Since all activities cannot take place at the same time at any single point, time itself has to be allocated across different demands. Time then becomes relatively a scarce resource in the production equation. Space, on the other hand conjures up meanings depending on the disciplinary context of its usage. Different kinds of space are recognised in the social sciences and in the natural sciences. In our case here, space is a quantity that describes the world around the observer. The observer is conscious of such space directly due to visual abilities and indirectly through modern communications, transport and mapping technologies. The totality of the space the observer is conscious of varies- as expected. What, in our case is critical, however- is that the totality of every form of resource is housed within this space.

Most of those who take up professional interest in environmental science come with a background of geography, economics, biology, ecology, chemistry or civil engineering and this has a direct bearing often on the way they situate it amongst other disciplines. For some, it is a societal concern with sustainable development. For such people, environmental science is not a discipline but a body of ideas and principles centred on the sustainability of humans on planet earth. This happens to be the general position espoused by most international NGO's dealing with environmental issues. For others, it is simply an extension of traditional geography; a look at the curricula of local departments at South African universities echo this. Indeed, the rationalization of higher education after 2000 saw geography departments re-configuring themselves into a maze of often unusual names. The same confusion is replicated across Africa, Asia and South America.

Given this contemporary set up, it becomes often difficult to establish the content, depth and coverage of common degrees in environmental science. But if we appreciate the essence of a discipline...as a particular body of knowledge whose practitioners have over the years already an

established and recognizable approach in the investigation and deployment of methods, techniques and, management of information to generate new knowledge, then PP is, in spite of whatever pretensions to the contrary, already an established discipline with surprisingly a large and diverse following.

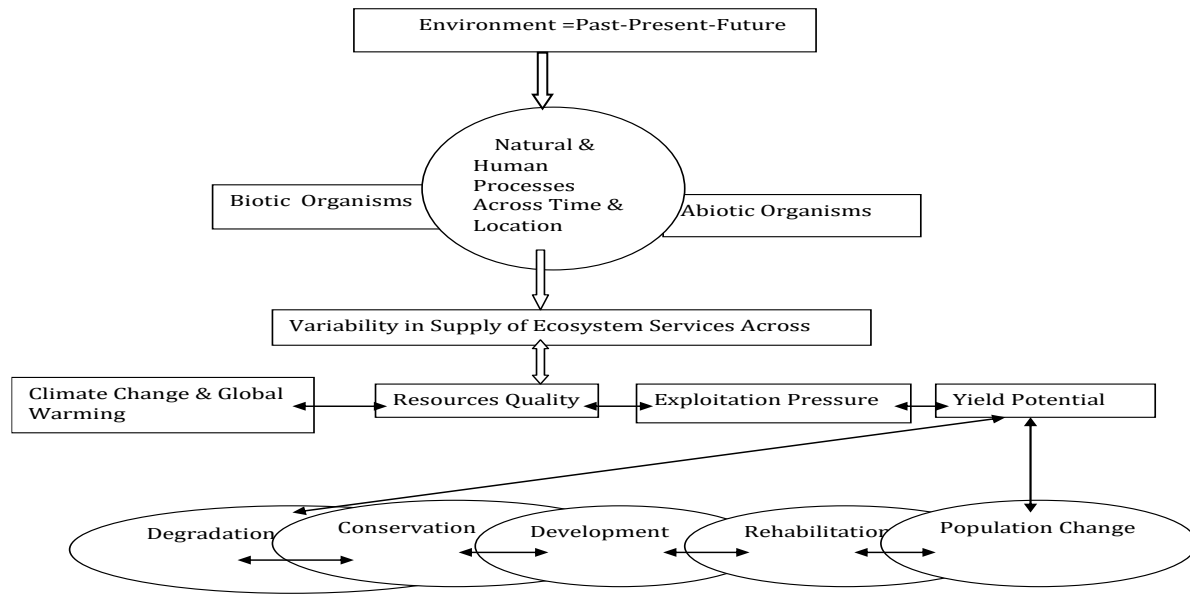


Figure Environmental science today

In Figure 2, the natural environment is presented as a living system [32,29] defined by the interaction between biotic and a biotic organisms and, natural processes that regulate the behaviour of planet earth and all that are found therein. Behaviour is dictated by the laws of nature but anthropogenic forces mean that the physical environment alone is not independent any more. The impact of human activity is often in the form of disruptive interference with processes whose performance may ultimately be impaired making it impossible for sections of the environment to sustain ecosystem services. This has been made worse by concerns about climate change and global warming [33] cumulatively making life on planet earth for both plants and animals vulnerable and high risk. *The very survival of the human race is at stake.* Conflict between environment and development arise because concerns with sustainability often generate opposing forces.

### 3.9 Contribution of the Process- Dimension

What does the process dimension offer today?

- A flexible applied science that straddles the social sciences, natural, applied and hybrid sciences to bring on-board methodologies that allow for the *coupling of human and environmental systems towards the ideal, which is sustainable environments.*
- Because the key processes and interactions that lead to a continuous supply of ecosystem services are known today, it is within the capacity of modern society to intervene in order to establish a kind of *balance* between the needs of development and the needs of environmental sustainability
- We understand the role of the environment in providing a platform for resources and the very space on which literally all production activities revolve
- Environmental science provides the tools necessary for assessing the environmental potential (**EP**) of areas against carrying capacity (**CP**) for land-uses thereby informing the means to guard against abuse, over-exploitation and degradation.

The concept of an environmental balance –see Figure 5-is best expressed in 4:

$$Eb=RP-RC.....(4)$$

Where Eb= environmental balance, Rp= resource yield potential has two thresholds: a minimum (RP-min) and a maximum (RP-max)level. Ideally, exploitation should fall in between, RC= rate of resource consumption, NR=the rate of natural resource replenishment (re-construction), t= duration . If  $RC < RP\text{-min}$ , ecosystem services will be sustainably provided.

If  $RC > RP\text{-max}$ , there will be an environmental collapse forcing conversion to other land use forms. If  $RC > NR$ , the provision of ecosystem services will suffer degradation leading to declining yields. In short, for a balance to be maintained over a sustained long term period  $NR > RC$ . But achieving such a balance presupposes the conduct of large scale resource assessments to compute RP, RP-min, RP-max, and NR in order to advise on the best land use that will allow RC and NR to co-exist. Note that expression (4) in fact does not capture the real essence of the resource allocation problem which is, how to exploit natural resources in a manner that does not threatened the natural processes of resource replenishment (reproduction).

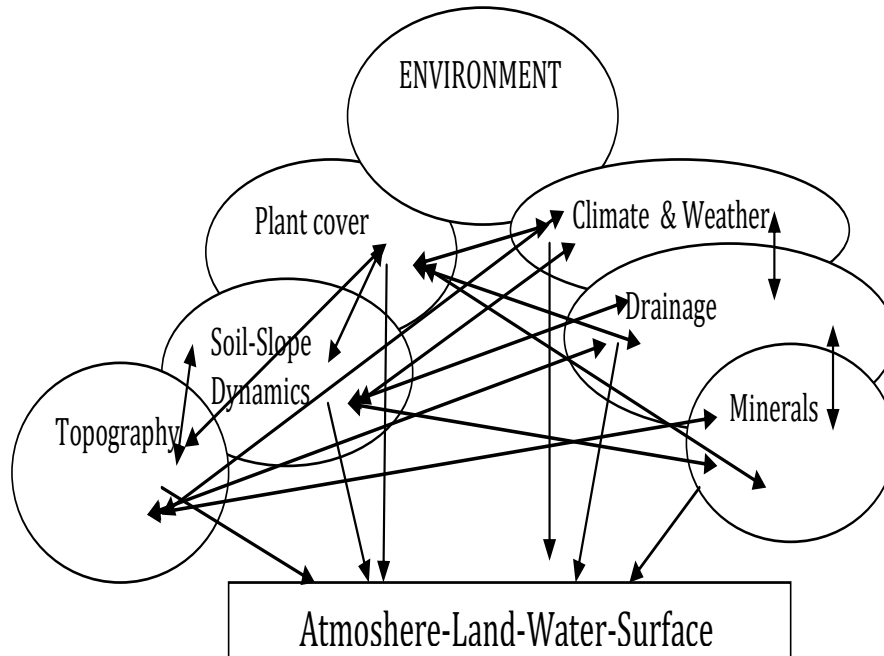


Figure 3: Environmental balance

But  $RP$  = a product of the state of the environment  $SOE$  in terms of the intensity of consumption pressure  $COP$  and other natural vagaries, denoted as  $V$

$$RP = \sum (SOE + COP + V)_t \dots \dots \dots (5)$$

The three conditions guarantee across time that there will be a continuous supply of ecosystem services to support human livelihoods. The opposite applies when the conditions are reversed or interfered with. Having identified a specification of the two, it becomes appropriate to link these standpoints to the issue of human progress.

#### 4. Human Progress

##### 4.1 Measures of human progress

From 1990 when the now popular human development index (HDI) was developed [34,41], more than 100 composite indices have since then followed all focused on several aspects of human progress and well-being. At the forefront of these indices has been the work of international organisations, government departments, NGO's, universities, private research centres and think tanks, consultancies and sometimes individuals. These measures are important in providing an

overall view of the state of countries and regions in recent years and, in acting often as a yardstick in benching performances. The common practice is to process data sets of country rankings as per period and, it is possible to use these rankings to trace what indicators have or have not improved. Like all indices, however, they suffer from problems of standardisation and often questionable design methodologies since they are, after all, products of subjective decision making. This lecture will not delve into the pros and cons of these measures because in essence they do not address the actual processes imbedded in human progress but rather an estimate of the state and quality of life at the country level.

**4.2 Input elements**

Resources, capital, organisation, technology, labour...traditionally called the “factors of production”<sup>[35]</sup>and innovation underlie our understanding of all human activities that are capable of generating a valuable return on investment<sup>[36]</sup>.

$$Wc = \sum(TVP, TCP, TECH, GOV)_i \dots\dots\dots(6)$$

Where **Wc**= wealth created at any time(*t*) by a community, **TVP**= total value of production of goods and services irrespective of scale and location, **TCP**= total cost of production, **GOV**= the role of government in creating a conducive climate across time, the state of technological development and the imbedded efficiencies that go with it. Given this, then **Wc** should occur only if **TVP**<sub>(*t*)</sub> > **TCP**<sub>(*t*)</sub> in an environment of progressive GOV .TECH and across time (*t*).

**4.3 Characterisation**

**4.3.1 Basic platform**

Human progress then is any sustained movement at the cultural and or nation state level that registers a sustained improvement in the living standards of the people. Measurement of HP is conventionally through variations in GNP<sup>[37,41]</sup>GDP, GGP, income per capita and HDI. inserted to show different indicators of human progress.

**4.3.2 GDP growth rates**

The distribution of GDP growth rates as of 2014 <sup>[59]</sup> is compared to parallel data showing income per capita against global population density <sup>[40]</sup>. It will be immediately noted that there exists sharp disparities between *wealth production, income and population*. Developing countries

score consistently high growth rates in the range of 5% + compared to developed countries. But as will be seen, the low base at which this growth is occurring means that they still have a long way to go in narrowing the poverty gap.

### **4.3.3 Income per capita**

Hence, per capita income [40,41] show Asia and South America performing far better on average than Africa. Income per capita remains a crude measure of wealth. This is made worse in those countries with extreme income inequality like Brazil and South Africa. In spite of this limitation, the case of Africa stands out in stark contrast to the rest of the world. North Africa, South Africa, Namibia and Botswana register respectable values. So is the tiny Gabon- due mainly to its rich oil industry. The rest of Sub-Sahara Africa has the poorest of the poor such that most of these countries appear at the tail end of the global list of countries by income per capita [40,41].

The population density map [61] throws all this out of alignment. Countries with the highest population density cannot be geographically characterised. South East Asia, Southern Europe stands out with few enclaves in the Caribbeans and Africa, Australia and Russia stand out for their low population density while south east Asia shows a consistent concentration of high values. Pathways to wealth creation , reported in [64] show that in the last 10 years, quite a number of developing countries have been performing well. The absence of data for so many African countries is disheartening as it indicates a failure to report annual production statistics.

### **4.3.4 Research and development investments**

Questions of data reliability [38,39] remain especially in developing countries where missing data even on population is still a widespread constraint. With reference to global R & D investment per capita [67], the northern hemisphere stands out as the dominant region, stretching from Japan in the East to Alaska in the west. Australia, New Zealand and South America also score high values. In Africa, apart from South Africa, Uganda, Namibia, Botswana and Madagascar, the rest of the continent is almost non-existent. The same sentiments apply to the global extent of researchers per capita at country level and comparisons thereof. Here, once again the northern hemisphere is dominant. This time, Uganda disappears! Only to re-appear with reference to the

extent of global technological development. While South Africa. top the African continent, Africa and the Middle East perform worst in terms of per capita researchers.

#### **4.3.5 Technology and innovation**

Technology, innovation and creativity are critical in human progress; a general summary of conditions as of Dec 2014<sup>[59,67]</sup> shows Africa's score as the lowest with respect to investments in research and development at a capita scale. The same applies to per capita researchers in and technological development. As a continent, Africa is the second most populous following after Asia but today, it accounts for less than 2% of global research output!.Often however, the differences are hardly ever appreciated ....at least in Africa otherwise there would be a concerted effort in policy initiatives across these countries for a drive towards modernisation. Overall, with the exception of few enclaves that are far apart, the general impression is that Africa is not in too much of a huray to jump on to the technology train.

Assumptions on the basis of which measurement systems are developed are constrained by scale limitations. Standardisation is often not possible because all countries do not have a similar administrative geo-set up. Comparisons across countries is often problematic and remains disheartening for developing countries. However, compromise manipulations exist championed by mainstream economics through which global datasets of indices are periodically compiled by such agencies as IMF, UNESCO, WHO, FAO and UNCTAD.

#### **4.3.6 Human development index**

The HDI is generated on the basis of a set of standardised measures at country level allowing for a global ranking<sup>[60,66, 68]</sup>. Often, the HDI value is often adjusted to bring on board certain weights for leveling the playing field. This intervention tends to throw well performing countries down the ladder of comparable success<sup>[62,65]</sup>. Since 2010, the HDI has been compiled using a new computation that pays attention to several input indices <sup>[40]</sup>:

- (i) life expectancy at birth,
- (ii) education index and
- (iii) a decent standard of living (GNI at purchasing power parity (PPP) against the US\$.

(iv) Life expectancy index= $\frac{LE-20}{85-20}$ ,



- (v) Education index =  $\frac{MYSI+EYSI}{2}$ , Where Mean of Years of Schooling index (MYSI) =  $\frac{MYSI}{15}$
- (vi) Expected Years of Schooling Index (EYSI) =  $\frac{EYSI}{18}$  and, Income index (II) =  $\frac{\ln(\text{GNIPC})-\ln(100)}{\ln 75,000-\ln(100)}$

Where GNI is national income at purchasing power parity against the US \$ currency.

Accordingly, a global ranking of countries as per HDI is generated. Of the 49 countries with the highest HDI score as of 2014, 32 are European, 4 are from the Middle East, five are Asian countries and five are from the Americas. Not a single African country features in this group. But when the levels of inequality at country scale are factored into the HDI computation, a significant number of countries either drop or are raised in their rankings. The USA, for example appearing at 5<sup>th</sup> position drops to 28<sup>th</sup> position with inequality factored in.

#### 4.4 Reconfiguration

Resources [NS] are at the centre of the development enterprise. The preceding sections have presented an overview of the diversity in indicators of human progress. From country to country, across regions and economic blocks, the most consistent characteristic is that of variation. *Humans are at different stages of progress.* This has been the case from time immemorial. Because natural resources are by nature scarce relative to their demand, the need for apportionment becomes critical. This calls for decision-making as to how to allocate such resources across competing uses. But this presupposes a deeper understanding of how humans see the world around them and deploy effort in transforming the same. It is necessary to recognise the fact that not all resources are natural. Apart from human resources [HS], we may add a second and peculiar type of resource- opportunity spaces [OS]. These are structures or quantities that naturally can be mobilized together with natural and human resources to facilitate achieving a desirable end product. Opportunity spaces and human resources are not under the direct control of natural forces neither are they scarce. They are available and their intensity can in fact be increased or multiplied to infinity.

In the daily struggles of life, there is diversity in the way humans perceive the universe and design interventions to facilitate residence, movement, production, interaction, leisure and recreation<sup>[63]</sup>. Resources which were earlier emphasized are central in this state of affairs.

Resources can be expressed in terms of several dimensions: quality, life span, market value, volume, density, distribution, ownership, accessibility and, location. The value people attach to a product of perception which in turn is a variable and an unstable quantity across time. At this point therefore, the general term resources will mean the sum of all **NS**, **HS** and **OS**

$$R = \sum (NS + HR + OS)_{t_i - t_2} \dots \dots \dots (7)$$

Where  $t_i$  and  $t_j$  denote two time periods

Perception eventually may lead to changes in behavior: but such change may be progressive (+) or it may in fact be degenerative (-) creating barriers to development interventions. Interaction with any environment generates signals across space with a declining intensity from the position of the observer. The more these environmental signals saturate the activity space of the community and society, the more people become aware and conjure up potential spinoffs. It is these potential benefits or possibilities that we have labeled OS in expression But their reaction to these signals is pre-determined by other environmental noises in the form of:

- attitudes,
- belief system,
- culture,
- history,
- personality,
- exposure,
- awareness,
- risk taking,
- state policies,
- state planning,
- external threats and,
- freedoms

This generates at any time two opposite forces (x)...progressive, affirmative, additive and developmental and (y)..regressive, negative, counter-productive. Consider for example that on some remote islands in Indonesia, indigenous tribes are opposed to rural electrification because according to them, such a development threatens their way of life. The stronger and extent of (y)

forces within a region or geographical space, the greater will be the effort (read energy and money) required to overcome them and still initiate progressive interventions.

If it is so, the sum of the (x)'s should be greater than the resistance exerted by the sum of the (y)'s at any given time and place, if HP is to occur.

$$\sum(X_1+X_2+X_3+X_4....X_n) > \sum(Y_1+Y_2+Y_3.....Y_n).....(8)$$

Using the same rationale, two districts (k, z) neighbouring each other and sharing similar biophysical conditions-weather, climate, topography, soil- may over the years generate a diversity of production livelihoods that show stark differences. Given time, in spite of district (k) being overpopulated, suffering resource over-exploitation, potentially high levels of poverty and general hardship in eking out a living...may perform better in literally all indices of **HDI** than the well endowed district (z). Could it be that the interaction along the (x,y) plane disadvantages the ability of the inhabitants of district (z) from responding to the diffusion of new ideas, information and technologies? Could it be that the inhabitants of region(z) are oblivious to the general advances made in region (k) that across time makes it a more attractive destination for investments? Is it possible that the inhabitants of (z) do not see the need to improve through imitation or copying and trickle down spill-over effects as a result of their proximity to region (k)? Is it possible that in fact, theories of diffusion only apply where the effects of the (y's) in any activity space are minimal? It is not possible to provide answers to these intriguing questions. But, raising them should directly show that there is so much out there about human behaviour across time-space that we do not yet have the ability to explain.

Certain state policies, for example, since the 1900's have in fact tended to enhance the -y's at the expense of HP. In the case of Sub-Saharan Africa, economic growth is associated with low schooling, political instability, underdeveloped financial systems, distorted foreign exchange markets, high government [37]. These weaknesses, while still valid in 2015, may have changed in terms of their relative impact on human progress from country to country. It follows therefore that every intervention, irrespective of scale, in the name of progress must by necessity confront a combination of social forces linked to the y's in addition to population change and its impact,

political climate especially the rule of law and the state of institutions and, the historical imprint in the form of evolution of settlement history. We may talk of drivers. Progress cannot be divorced from production. In geography, - for example, unlike in physics, work must carry with it a value connotation if it is to contribute to the generation of wealth. From this viewpoint, *work becomes a productive deployment of effort to create wealth*. In environmental science, however, work remains the amount of force exerted over a specified distance to initiate change. Such change may or may not be directly capable of generating value in resources.

Technology is a critical input in most forms of human progress for it represents the process of converting resources into value. But this requires creativity which in the practical sciences translates into innovation<sup>[35]</sup> as measured by new patents registered at the level of the individual state. Earlier, a series of global maps showing the state of development with reference to number of researchers, R&D investments, GDP, income per capita, innovation and technological developments were presented. Global data sets so far earlier referred to show the extreme inequality in the status of human development. Innovation clusters, like the Silicon Valley in California, USA, are variable in global context and in their relative ranking. At the local level, Gauteng in South Africa, perhaps represents the greatest concentration of technology firms, most falling in the new knowledge economy. But, it is now accepted that widespread innovation activity is linked to state policy and a particular type of education and training. Often, in line with IMF publications, the general tendency is to equate human progress with the extent to which a country's performance and domestic markets shows signs of similarity with developed western economies <sup>[40,41,44]</sup>. This fails to inform us about the actual reality of human livelihoods on the ground just as GDP statistics...though impressive for the so-called emergent economies say almost nothing about the status of HDI.

#### **4.5 Common platform for SP and PP**

What does the SP and PP approaches offer to our understanding of human progress? Practitioners of the SP approach see progress as a complex process that involves products of resource perception<sup>[42]</sup>HP requires a successful adaptation to the vagaries of climate change, global warming and resource limitations<sup>[43,31]</sup>. And, its imbedded processes call into play interactions across time, period and location. This leads to the evolution of social landscapes

that are consistently variable across regions, countries and districts. In all this, there is evidence of the capacity of humans to identify and exploit opportunity spaces. Practitioners of the PP approach see progress as achieving the sustainability of ecosystem services through which the environmental health of all biotic organisms is ensured. This calls for matching land-use with resource potential...through optimal allocation of land-uses to ensure sustainable livelihoods. The design of production systems that allow natural processes to continually replenish and rebuild the biophysical landscape is critical. Put together, the two provide the medium for understanding multiple process interactions- often referred to as *coupled-human-environment* systems (CHES)[<sup>30</sup>] in the literature that give rise to diversity in the human imprint.

#### 4.6 Integration

Human progress is possible only if there is in place, established decision-making structures [DMS] [<sup>46</sup>] in the form of individuals, groups, firms, organizations, institutions and, government. Through perception these *DMS*'s.....identify the nature and potential of resources. Productive perception [PT]requires higher levels of information processing[<sup>47</sup>]in which decision makers must confront five parallel planes of data: resources and their potential,(Z1), population size, structure and pressure (Z2) (iii) socio-economic indicators(Z3) (iv) participation rates (Z4) (v) policy-planning and governance climate(Z5) and other environmental noises (Z6)

$$PT = \sum(Z_1 + Z_2 + Z_3 + Z_4 + Z_5, Z_6)_{t_1 - t_2} \dots \dots \dots (9)$$

Where  $t_1$  and  $t_2$  denote two different time periods

Productive decision making is naturally driven by (PT) and should trigger elements of HP if and when such translates into the actual deployment of factors of production (FOP) into the output of valuable goods and services at sites across geographical space. But the way different units of *production* react and respond to the occurrence of resources, make decisions and deploy factors of production varies. This *variation* is in time and across time and space.

From an economic perspective, the responses vary in:

- *speed,*
- *direction,*
- *intent,*
- *interest,*

- *consistency and*
- *significance*

The resulting *decisions* on land use choice<sup>[45,46]</sup> and utilization, too, vary from place to place – even when time is assumed held constant (insignificant variable).

But land use choice is pre-conditioned on an understanding of basic environmental processes<sup>[31,30,43]</sup>soil formation, sediment formation, plant succession, global warming, land degradation, soil erosion, natural remediation, slope weathering, natural selection. The physique of a given landscape will influence the resulting abiotic processes at work which in turn may impact on the perceptions of humans when they interact with specific locations. The relative efficacy of environmental processes<sup>[31]</sup>change with, in and through time space so that the resulting landscape, even in the absence of human influence (anthropogenic) is permanently in a state of change. Issues of land-use choice and carrying capacity for agribusiness enterprises therefore require inputs from both the spatial and process perspectives.

## **5 The Argument**

*“People in the form of individuals, households, groups, classes, communities, firms, organisations and, institutions form the most important point of departure in understanding HP”.*I wish to argue that *it is the rates of response* to resources that drive human activities at various scales .from households to multi-national corporations. All physical resources are part of the geographical space which equates to the totality of the world around us. The responses are triggered by perception through time and second-by the possibility of strategic investments as a reaction to the immediate activity spaces. Often, too, these responses are conscious of market demand. What does this mean? That what drives HP *is the manner in which people perceive resources, invest capital, labour, organisation, land, innovation and, technology into production that ultimately improves their earning power and command over goods and services translating into better living standards.* Contrary to often unscientific claims in the last one hundred or more years, all humans are capable of this irrespective of where they live, their race and level of civilization. The critical issue is *how fast* they are able to do this (time); hence, the distinction imbedded in “rates-of-response”. But “rates of response” imply a relationship between tasks and the time it takes to do them. This has an inherent speed or velocity component. The related

concepts of distance decay and time compression [<sup>51</sup>] are an extension of the concept of “rates of response” (read change). Every form of development be it industrialisation, accelerated urbanisation, green revolution, the information highway, generates different forms of time compression. Humans are able to do more and more with less resources and in less time. *This calls for a different way of mobilizing technology in resource exploitation and points to issues of innovation, creativity and a consciousness about the need to make the world work for us.* At a higher level, the more progressive society becomes, the greater will be its capacity for control over natural forces. ***The speed at which we are able to achieve significant time compression in our productive behaviour is at the heart of HP.***

By necessity therefore, since this speed is inherently ***variable*** as earlier captured in expressions 1-to-9, it follows that the outcomes will produce human imprints once again at ***staggered time*** periods and locations. This may explain why different areas develop at different rates and why, literally in every country, some areas are described as fast-moving while others remain stagnant. The differences in these response rates, amounting to the apparent friction of distance<sup>[48]</sup> account for sharp variations in the levels of HP down to the level of constituent geographical areas in single countries. ***Implied here is that the forces that retard the forward thrust of a community (Refer to expression 7) across time need to be understood, appreciated and factored into contemporary development theory, policy and planning.*** Using a single widely available resource-base and a community that is culturally similar, the resulting patterns of investments that drive labour participation in the mainstream economy and the generation of wealth will vary even at the level of a small geographical area, like a district. This variation results into infinite response options that underlie the ***diversity***[schema-in the title of this lecture]of the development enterprise. This position is not well articulated by many of the international organisations concerned with HP. The same often applies to national development policies. Countries that have since the 1960’s received massive direct investments [FDI] are not necessarily those that today display consistently high growth rates. ***What is critical is how countries have in their history successfully deployed such aid across time-space to drive HP.***

In summary, the various dimensions of HP have been represented through a set of simplified notations:

- Human development across  $t_1$  and  $t_2$ ,  $z = \frac{y}{p}$  .....(1)
- Human progress,  $HP_{t_2-t_1} = \Delta z$  ..... (2)
- Human progress,  $HDI_{t_2-t_1} = \Delta h$  ..... (3)
- $E_b = RP - RC$  .....(4)
- $RP = \sum (SOE + COP + V)_t$  .....(5)
- $W_c = \sum (TVP, TCP, TECH, GOV)_i$  .....(6)
- $R = \sum (NS + HR + OS)_{t_i-t_j}$  .....(7)
- $\sum (X_1 + X_2 + X_3 + X_4 \dots X_n) > \sum (Y_1 + Y_2 + Y_3 \dots Y_n)$  .....(8)
- $PT = \sum (Z_1 + Z_2 + Z_3 + Z_4 + Z_5, \dots Z_n)_{t_i-t_j}$  .....(9)

The nine different expressions describe various dimensions of human progress (1,2,3), environmental balance (4), resource pressure (5), wealth creation (6), an expanded definition of resources (7), the role of progressive and regressive forces (8) and finally, the concept of productive perception (9). *I must caution that these nine expressions are not exhaustive:* I do not claim that they cover the totality of human progress. I have only singled them out because they link directly with time-space-response. They have been used to build up a logical structure but simultaneously to retain inherent multiple-processes-at-work across time and space. These ideas inform the design of the schema that follows in the next section.

## 6. Time-space-response schema

Following so far what has been advanced, a set of assumptions is specified to demarcate the application possibilities of the resulting conceptual schema:

- Human progress is not an accidental occurrence. In the words of Martin Luther King, Jr., *“Human progress is neither automatic nor inevitable”*
- Human progress is a product of deliberate decision making at variable scales through time.
- Human progress presupposes the access to resources in a structure that frees market forces to operate.
- But access to resources while a necessary factor will not guarantee HP.
- Different units of production participate in this decision making, once again, at variable rates and at different locations.



- The way decision-making units respond to resources and mobilize inputs into focused long term investments to get positive benefits (read return to scale) is at the heart of HP.

If this is true, then *the quality of decision making units* becomes a critical determinant of the rates of change across time. Indeed, acknowledging the role of “agents” in the development discourse would appear to support some of these ideas. Governments put in place institutions, planning and policies to ensure sustained political stability as a base for actors to engage in wealth generation. But across many developed and developing countries, the policies put in place often:

- constrain
- block and,
- misdirect human effort.

Often leading to cases of:

- economic collapse,
- negative growth,
- economic stagnation,
- large scale environmental degradation and,
- political upheavals.

Indeed, the term “failed states”<sup>[49]</sup> captures the hardships experienced in some of the developing countries today. At a different level, the policy and planning climate may create a complex interplay of forces that actually undermine the ability of society to engage in wealth creation that drive HP.

But the diversity in behaviour in response to environmental perception varies across and within countries even if history, culture and religious belief were held constant. *This is why in every country at any time in history, there are areas that are progressive and others that appear to have been forgotten even by time itself.* In economics, it is now generally accepted that there is no single magic bullet that spurs HP (read economic growth); what works/has worked for country(k) may not do for country (z). It is also generally agreed that different countries following different trajectories may still achieve impressive sustained growth. We are now aware

that seeing HP simply as a reproduction of historical processes tracing back to the industrial revolution may at best be naive. *Every developing country will not necessarily go through similar stages of growth, as for example, England, France, China or the USA.*

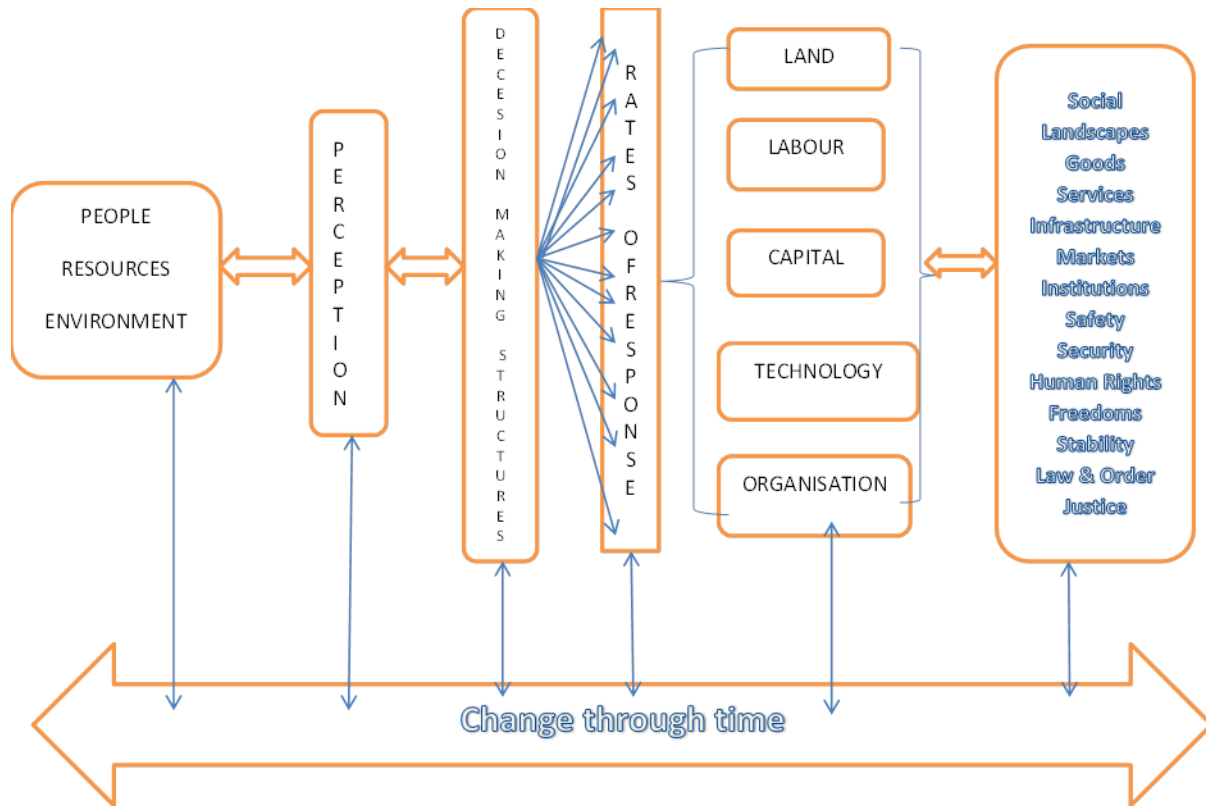
Five outstanding features about the configuration as represented in Figure 4 are worth noting. First, using the initial platform of *people, resources and environment*, the impact of parallel, contradictory and multiple processes at every stage hereafter calls for caution in making predictions about the direction of human progress. Second, while perception and decision making are today widely used concepts across the social and applied sciences, I have used them in a “constrained” fashion to demarcate their spatial implications and, in the process, generated a sub-concept of *productive perception*. The implications will be dealt with at other forums. Third, on the basis of this schema, I have presented time, *not just as duration, but more important as both a premium resource and as a dimensionless space* that allows for activities to unfold. (a point earlier made but re-emphasized again). This amounts to a re-definition which is context specific. In this context, time becomes a resource in short supply, though, the general wisdom may see it otherwise. Fourth, ***HP is and remains a cumulative process triggered by a multiple set of forces with often unclear internal interactions.*** Understanding these interactions becomes critical because it provides the information necessary in designing interventions aimed at shaping the onward momentum of HP across time and space. Fifth, the outputs of HP commonly measurable at any time through a variety of composite measures [41] often do not highlight the incredible multiplicity of possible outcomes.

***The schema tells us that the outputs of HP at any time will show variations across scale because of the multiplicity of control drivers in expressions 1-to-9. I call this a possibilities frontier and, it may provide the means to answer the age old question of why “uneven development” has become a form of natural truism across all countries.***

Time and resources are two critical quantities in HP. But more important than the two is the differentiation in the rates at which humans respond to the two quantities. Given this understanding, it should be possible to engineer the rates of response of any society by reducing the retardation forces earlier labeled the (y)’s. A consistent long term reduction in the sum of the (y)’s should create space for investments in activities that drive HP<sup>[50,51,52]</sup>. This amounts to

some kind of social engineering reminiscent of communist block countries before 1985. But there is widespread evidence that countries do indeed initiate sustained long term programmes aimed at either shaping behaviour or directing it along a predetermined trajectory [63,64,65,66]. Apartheid itself was an experiment in social engineering that went wrong.

Human progress cannot wait for time; for time is itself a resource; a position often not fully understood in most discourses about HP. And the common saying that: “in Africa- take your time for there is no hurry” is to say the least, indeed unfortunate. Development interventions by states, the private sector and agencies, could learn lessons from this. These ideas are best represented in a time-space-response-schema as appears in Figure 4.



**Figure 4: Time-resource- response schema**

Source: Author

## 7. Linkages beyond HP

What then are the implications of the schema beyond human progress itself? These are as follows:

***Process:***

- Human progress is a set of continuous processes in the form of a spectrum with neither a clear starting nor an end point.
- HP therefore requires that every country develops, as it were, a flexible package of inputs with a high probability of triggering predictable growth trajectories.

***Drivers:***

- Human progress is driven by both internal and environmental forces and,
- HP goes with imbedded mental processes as humans adjust to an ever changing environment.
- These adjustments are for our case, always deliberate.
- The desire to improve one's status is assumed to be universal
- But this assumption, may in fact have no scientific basis;
- Instead, it is more prudent to talk of adaptation to both internal social dynamics and responses to the availability of variable resources.

***Decision Making Structures:***

- Understanding the drivers of HP is premised on the quality of decision making structures;
- But, the environment in the form of the market process generates signals that impact on the responses of communities.
- Such signals are in the form of information waves and by necessity , the role of information processing has to be appreciated.
- A measure of the quality of decision making structures in any society is captured in the concept of “ productive perception”.
- It is these mental processes that underlie and drive the formation and articulation of decision making at any point in time.

***Responses:***

- People are not docile travellers on the human progress conveyor belt;
- Though, the *law of least effort* may encourage such apparent behaviour.

- Some members of every community at any time and place tend to be agents of change while the rest tend to follow the momentum at a slower rate
- The energy and commitment to HP varies, is unstable and unpredictable
- But community responses are often held at ransom by repressive regimes, religious affiliation, cultural fixation and the sheer fear of the unknown
- So that the tendency towards conforming to the status quo attracts greater wholesale support than any disturbing change-inducing processes.
- This, incidentally may partly explain why there exists so much opposition-direct, indirect, conscious and unconscious- to any form of proposed change at any time

***Governance:***

- Governance is very critical in all processes that drive HP but this calls into question the *quality of governments* across the entire modern world.
- While-for example- mainstream economics teaches us that bureaucracies are expensive to maintain, hinder the attainment of efficiencies and are a drain on the treasury, most countries...
- Tend towards increasing the size of the public sector.
- This holds true even for the poorest countries.
- Some governments in developing countries show amazing genius not in innovation but in the creation of fictitious, dubious and laughable public sector positions
- But governance, itself has to put in place a combination of inputs-controls- and operational climate conducive for people to engage in productive behaviour.
- Every government should target putting as many of its population as much into some form of production
- But this may conflict with existing labour legislation and union activities; this is different from the demand that governments should create employment.

***Resources:***

- Governments are not in essence designed to provide employment,
- Rather their basic function is to provide a governance structure that creates an enabling environment for people + firms + institutions to engage in production.

- This directly talks, for example, to the access to resources that a population has and the extent of constraints imposed on such access.
- Higher labour participation rates increase the command over resources that households possess.
- Recall, however that consumers and producers co-exist on a continually changing platform.
- The tragedy of developing countries is that globalization has opened the flood gates of international trade and made their people experts at consuming foreign products and forgotten the need to produce for ourselves!!
- An optimal mix of growth inputs that works for country X cannot be applied, as is, to country Y
- This calls for long term strategic social-economic policies that drive the country cumulatively from  $t_1$ - $t_2$  over a sustained growth trajectory.

## 8. Contribution to knowledge

What then are the components of evidence for the views imbedded in the schema I have presented in this lecture? My research work since 2000 has been housed within the theme: *environment & economic growth [EEG]* and, in the process has tentatively touched on several aspects of content covered in this lecture. Outputs of this effort is reported in seminar papers, conference papers and in international peer-review journals as evidenced by my presence on *Google Scholar* citations.

From a multi-disciplinary engagement, my research supervision to date has seen 9 course masters degrees in *Development Studies*, 2 masters in *Geography*, 4 research masters in *Environmental Science*, 1 PhD in *Economic Geography* and 2 PhD's in *Environmental Science*. Four PhD candidates submitted in November 2015 and we await feedback from examiners with the usual excitement and anticipation. My current supervision involves 3 PhD's spread across:

- concentrated solar energy optimization,
- water-demand management and,
- potential of ephemeral ponds for irrigation

With reference to human geography, the focus of my research work is on *economic growth, urbanisation & agrarian transformation*: where the research effort has been on: re-engineering spatial behaviour in order to cause a radical shift in production patterns [58,3,7,15]; changes in wholesale-retail sector and consumer markets[11,16] The fortunes of the small business sector is shown to go through boom-depression cycles similar to traditional economic cycles. But the informal sector is found not to show evidence of convergence towards the mainstream economy. The result is the operation of a dual economic structure in spite of intra-transactions between the two.

In the case of *urbanisation*, my research has covered South Africa where concern is on small towns, urban sprawl and in establishing synergies between policy, planning and practice[4, 56,46,54 ] to establish whether these are appropriately responding to the reality on the ground. Further studies have focused first on managing explosive urbanisation in Africa [38] and second, on tracing growth projections of the cities in Eastern Africa [39].

Turning to *land reform and agrarian transformation* the focus has been on unpacking the development process through identification of growth obstacles. The results show that often policy imperatives are out of touch with the harsh realities of access to resources [12]. Research findings indicate a consistent failure of state policies to respond to the persistence of poverty in the countryside [13]. Here interventions through land reform programme, land restitution and resettlement produce results that have hardly had any noticeable effects on the pre-1994 apartheid social structure[42]. For the entire Sub-Sahara Africa, my research questions conventional methods that have in the past been reported in literature on the assessment of land reform programs [45]. The fear of disrupting large scale commercial agriculture in any radical land re-distribution programme means that the masses of the poor remain poor and landless. The emphasis on improving services and infrastructure has not touched on the status of land access neither has it changed production relations in the countryside.

With reference to environmental science, my research work is centred on waste management, natural resources & renewable energy: Municipal waste management is today a major global concern due to increasing urbanisation, to this end characterisation of waste management

structures<sup>[8,57]</sup> practices and planning indicate a multiplicity of management problems linked to financing and planning weaknesses<sup>[8,57]</sup>. Findings indicate that across SA and Zimbabwe, waste management is not treated and financed as an urban priority, leading to persistent under-funding in municipal annual budgets, lack of appropriate equipment and trucks, failure to design and develop landfill sites, lack of organised waste recycling facilities and poor waste information systems. At a second level, work has centred on municipal waste compliance in Limpopo, medical waste handling in the Free State <sup>[57]</sup> and, climate change adaptation <sup>[55]</sup>. In the case of SA, the failure of municipalities to meet compliance waste standards is noted. Across this research, a clear mismatch is noted between policy expectations and current waste operations on the ground.

*Natural resources planning* is another sub-stream of my current research work. Here, research work is centred on testing the thesis that current natural resource planning practices have not informed land-use allocation resulting in large-scale environmental degradation<sup>[30]</sup>. The failure to plan on a large scale district-regional basis other than for urban areas and wildlife reserves and the few plantation enclaves tends to undermine attempts at movement towards a green economy.

With reference to *renewable energy resources*, research work on biomass development in SADC countries <sup>[52]</sup> shows that outside *Botswana, Namibia and South Africa*, the rest of the countries will still take 20-40 years to transform from a dependence on biomass energy to fossil based energy. In Sub-Saharan Africa <sup>[52,53]</sup>, findings indicate that in spite of abundant renewable energy resources, almost all countries have tended to ignore rural areas in extending grid electricity; this has had negative impacts on agricultural modernisation and the growth of cottage industries. Work on solar energy in the Northern Cape involves optimizing the technology for concentrated solar power generation.

Integration of SP and PP is covered in the cross-cutting broad theme of *environment & economic growth* in which the focus of current research is on *coupled human-environment interactions* that allow for spatial modeling that lead to *sustainable social environments*<sup>[30]</sup>. Here, the gist of the research work is built on the premise that the contradictory needs of economic growth and the environment can be re-engineered through changing human behaviour to cause a movement



towards optimizing resource use across time by modeling interventions that are locally relevant, scientifically biased but which are sensitive to the long term needs of environmental sustainability. Information processing, innovation and technology play a critical role in this matrix of relationships. The gist of my thesis is that there is an urgent need to accelerate the rate at which society changes; for, this lies at the heart of the human progress equation. As to whether current development approaches have adequately factored this into the long term policy imperative remains doubtful. *Indeed, at a deeper level, few governments in Africa seem to be worried about the slow progress made since independence.* For the rest, there seems to be no noticeable mobilization of the masses of the people to achieve faster growth rates. This raises questions, not addressed in this lecture, about the extent of genuine interest by governments across the modern world, in human progress.

## **7. Conclusion**

In this lecture, I have briefly indicated what the spatial perspective and process induced behaviour can contribute in bettering our understanding of human progress. But in the process, I have indicated an opportunities frontier that provides a radical departure in the way conventional wisdom treats human progress. It is in this respect that I hope I have reached out to a wider audience than conventional approaches in the natural and applied sciences would allow.

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Thank You!.

Dankie!

Kealeboga!.

Enkosi kakhulu!.

Asante Sana!  
Mwebare Kumpuririza Naho Ninye!  
Nyamuhanga agume neimwe!

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### **About TM Ruhiiga**

Is currently Chair: School of Environmental & Health Sciences Research committee, at the Faculty of Agriculture, Science & Technology. A member of the *South African Council of Educators and the Society of South African Geographers*. Prior to joining North West University, he taught at high schools in *Uganda, Kenya, Lesotho* & the former homeland of *Transkei* before moving to the University of the North. He has since taught at the University of Limpopo and the University of the Free State. His university duties include being an academic representative of FAST in the Campus Senate and is a member of the Institutional Senate.

His research is in the area of Environment & Economic Growth with focus on urbanisation, agrarian transformation, waste management, natural resources and renewable energy.

International recognition has been as a reviewer for the following peer-review journals:

*Journal of Human Ecology*

*Journal of Social Science*

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### **Professor Tabukeli Musigi Ruhiiga**

Prof. Ruhiiga was born in Kigezi district, Uganda. He attended his primary and high school education in Uganda before he was admitted to Makerere University where he received a *Bachelor's degree* with upper second class honours majoring in Geography & Literature, together with a Concurrent *Diploma in Education* in 1979. This was followed with *Diploma in Accounting* and in *Diploma in Business Finance* with I.C.S-London in the period 1984-1988. He did an honours degree in geography with Unisa in 1992 and then registered for a *research MSc* degree in economic geography with University of Fort Hare which he obtained in 1996. In 1999, he joined the University of the North and simultaneously registered for a *PhD in Human Settlements*, graduating in 2002. This was followed by a stint in the private sector as a business consultant, training facilitator and project manager till 2005. He then taught at the University of Limpopo (Polokwane) and the University of the Free State till November 2009, when he moved to the Mafikeng Campus of NWU.