

- Making a Difference –

Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries

Web-based 'Discussion-Support' Agricultural-Climate Information for Regional India

The following collaborators worked on this project:

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OVERVIEW OF PROJECT WORK AND OUTCOMES

Background

The somewhat rapid development of computer-aided decision support systems were regarded as a panacea that would be able to bring about a means of joining complex climate forecast model outputs with crop and pasture simulation models outputs in graphic or tabular form. Yet, it was becoming increasingly obvious that farmers, while being the intended recipients, were not the major users of computerized decision-support systems. Instead, what were known as, 'kitchen table' discussions developed ('discussion-support') whereby outputs of integrated climate-crop simulation were provided face-to-face' by a visiting farming systems specialist so that free discussions could evolve in order to derive a range of key decisions that could then have practical value to the farmers present (McCown et al., 2002)

However, while the above concept has proven valuable for small local farmer meetings it was realized it may be difficult to scale-up the process whereby many thousands or millions of farmers would benefit, especially when large developing countries were considered. Thus, it was considered somewhat urgent to develop a more effective means of integrating aspects of climate forecasting into core farming decisions if farmers were to remain sustainable. To achieve this, investigation of the use of advances made in distance learning environments (at universities), in particular, 'eLearning' processes involving the use of avatars that could synthetically create real world and real life scenarios, has been made for consideration in this project.

Objectives

The project aimed to accomplish two core aspects:

- Through participatory workshops, conducted with both farmers and also extension and agronomic specialists in Andhra Pradesh, identify those key decisions related to farm management that may be influenced by climate variability (and, to some extent, climate change) and, thus, amenable to the input of climate forecasting.
- As a case study and core pilot project component, ascertain whether it would be feasible to develop an interactive, practical, customizable, web-based 'discussion-support' portal that would be able to transmit and disseminate vital climate (forecast) information on an ongoing basis at a range of scales via a synthetic set of discussion scenarios and involving farmers typical of the region. The discussions would be primarily formulated through the identification of key needs obtained through the participatory workshops held with farmers and extension specialists in Andhra Pradesh, India.

Amount received and number years supported

The Grant awarded to this project was:

US\$ 34,796 for 1 Year.

Activity undertaken

Participatory Workshops and 2nd Life eLearning video production.

Through the expert guidance of our core collaborators, ANGRAU University, Hyderabad, and especially through the work of Dr Raji Reddy and Dr Sreenivas, a series of workshops were developed in two core themes:

- Expert participation workshops and meetings mainly conducted at ANGRAU University, Hyderabad, involving specialists from India and Australia in agronomy, rural extension, climate science, meteorology, 'eLearning', and computerized systems. In particular, local specialists in agronomy and rural extension provided valuable input into the discussions. An additional meeting was held at Tamil Nadu University where Dr Geethalakshmi and

colleagues, provided input on the needs of farmers regarding to climate risk management. It should also be noted that some leading ‘champion’ farmers also attend these types of workshops.

- Farmer-oriented and user-driven workshops (two held so far with another planned before the onset of the summer monsoon, 2011) that were held primarily in the village of Biranpalli, Andhra Pradesh, but also with the farmer and advisor users of an Internet Kiosk facility at Ragunathpalli, Andhra Pradesh. These farmer-oriented workshops were primarily developed by Drs Raji Reddy and Sreenivas and colleagues whereby farmers were asked to speak freely about their concerns with weather and climate impacts, what key decisions they made and how might climate forecasting assist these decisions. Invited expert, Dr K. K. Singh of IMD, together with Prof Roger Stone provided climate science input into the workshops. Farm field walks were also conducted to determine first-hand the impacts of pests and diseases caused by excessively wet weather. Importantly, these field walks with the farmers also facilitated further discussion on key aspects of their decision-making processes and possible value of climate forecasting for their exact needs.

USQ Distance Learning personnel were engaged in depicting real-world climate scenarios that were relevant to the lives and practices of farmers in Andhra Pradesh. Additionally students from Andhra Pradesh who were studying at USQ were recruited for the video production in order to provide locally relevant languages and accents that would be familiar to farmers in Andhra Pradesh. In this a series of videos were scripted by both Professor Stone and Dr Raji Reddy that entailed synthetic actors but which dealt with ‘real-world’ scenarios and situations in Andhra Pradesh. In particular, voices used in the videos were those of native speakers of the region (Telugu language) together with a video spoken in Hindi and a video spoken in English.

Results

With the considerable assistance of colleagues at ACHARYA N.G. RANGA Agricultural University (ANGRAU) and Tamil Nadu Agricultural University (TNAU) as well as at Indian Meteorological Department (IMD), the team at the University of Southern Queensland (USQ) produced a series of videos containing avatars as actors and which have, in the scripted videos, discussed real-life farming situation in Andhra Pradesh, the relevance of climate forecasts on offer and what action the farmers may consider.

The workshops proved highly successful. ‘Armed’ with feedback obtained at these farmer workshops the ‘eLearning’ web-based portal team set about developing the pilot customizable, web-based climate ‘discussion-support’ portal that would be able to transmit and then disseminate climate forecast information of the type suitable for the key group of farmers in Andhra Pradesh.

The following processes have been developed:

- Videos containing the avatar actors in a 2nd Life environment have been placed within a web-portal environment at USQ for user access.
- Aspects related to input of climate forecasts from recognized sources for use in discussion scripts in 2nd Life videos have been achieved.
- Copies of a ‘final video’ have also been made available to local village television.
- Farmer feedback has been forthcoming regarding style, content, and value of the videos and workshops.
- Development of a process that focused on the management scenarios pertaining to the core (summer) monsoon period.

Relevance to the APN Goals and Science Agenda, Scientific Capacity Development and Sustainable Development

It is believed this project has been well aligned with the *CAPaBLE* major goal of improving the scientific and technical capabilities of scientists and decision makers in developing countries through:

- Addressing all three key objectives of *CAPaBLE* through the capacity building and establishment of new ground-breaking web-based channels of communication,
- Sharing newly understood aspects of climate science through the interactive, participatory, workshops incorporating scientists, decision-makers, focus groups and farm managers,
- Facilitating process that will lead to the utilisation of a continuous provision of climate information through innovative web-based tools,
- Through this approach, enhancing the scientific capacities of aspiring scientists in India in researching and improving those decision-making decisions relating to adaptation to best management practices, managing climate risks, and enhancing food security and sustainable development, and
- Assisting dissemination of new and improved climate information to vastly wider group of users than otherwise would be the case, especially including decision-makers at grass-root levels, in order to further enhance resilience and improved overall well-being of farmers.

Thus, this proposal has linked to the *CAPaBLE* objectives of:

1. Capacity enhancement of leading researchers in developing countries (India) to produce comprehensive scientific results on climate change impacts, vulnerabilities, adaptation and mitigation.
2. Capacity building of aspiring scientists (especially at ANGRAU), through the sharing of knowledge, experience, scientific information and data collection on climate change impacts, vulnerabilities, adaptation and mitigation.
3. Improvement of informed decision-making in developing countries (e.g. India) by dissemination of the outcomes of research activities to policy-makers and civil society.

Outcomes

A core outcome from the project is a greatly enhanced understanding by those in distance education and climate science fields of the challenges that need to be overcome if 'synthetic avatar' approaches can reproduce key aspects of a real-world discussion-support environment involving farmers and climate forecasts. A second outcome is an enhanced opportunity for farmers and advisors to gain ownership of climate forecast information relevant to real farming practices in India.

Non-technical summary

Advances have been made in 'eLearning/2nd Life' education processes where scripts relevant to the real-world can be applied to construct discussion environments which can be relayed anywhere in the world to users using internet technology. This technology has been developed together with background research on the exact environment in which the farmers in India are making decisions and in which specific climate scenarios are in keeping with national climate forecasts.

This project investigated the potential for use of this technology involving Andhra Pradesh farmers with substantial assistance from colleagues from ANGRAU and Tamil Nadu Agricultural Universities. Following workshops held in Hyderabad, Biranpalli, and Ragunathpalli, three '2nd Life' videos have been created which captured farmer decisions plus actual climate forecasts relevant for the needs of the farmers. The project demonstrated that it is possible to provide video productions of discussion environments that contain real-world decisions and climate forecasts in real time. Feedback from

the farmers revealed that while the science content regarding climate forecasts and implications for farming were very useful, they asked for even more realistic depiction of the characters in the video (dress, age, numbers of farmers participating) in order to convey a 'real-world' setting for them.

Self evaluation

Positive aspects:

- The project demonstrated, within the planned time-frame, the capability of 2nd Life/eLearning education approaches in creating discussion-support systems for farmers involving real-time climate forecasts – and demonstrated for farmers in Andhra Pradesh.
- The team of USQ and especially ANGRAU delivered all the key requirements of the project.

Areas that could be improved:

- Aspects related to better timing of such project initiation to avoid periods of excessive heat before monsoon onset.

Potential for further work

It is believed there is considerable scope for further development of this approach for other world regions as well as for other regions and farming environments in India. Outputs from this project have been presented to UN WMO Commission for Agricultural Meteorology workshops and meetings with good, positive support received. Potential for further development of this approach is possible through new project development being prepared by the US Department of Agriculture for a more comprehensive discussion support system for Africa.

Publications

None at present but various publications are planned for (a) UN WMO Technical Publication Series (b) appropriate journals relevant for climate/farming extension.

References

McCown, R.L., Hochman, Z., and Carberry, P.S. (2002) 'Probing the enigma of the decision-support system for farmers: Learning from experience and from theory', *Agricultural Systems*, **74**, 1, 1-10.

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- ACHARYA N.G. RANGA Agricultural University (ANGRAU), Agromet-Cell, ARI, Rajendranagar, Hyderabad -30, India.
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- Dr Sreenivas, Scientist, ACHARYA N.G. RANGA Agricultural University (ANGRAU), Hyderabad.
- Dr V. Geethalakshmi, Professor and Head, Agro Climate Research Centre, Tamil Nadu Agricultural University, Coimbatore - 641 003.
- Students from Andhra Pradesh who are currently studying at the University of Southern Queensland and who participated in preparation of 2nd Life videos and other background aspects.
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TECHNICAL REPORT

Preface

The project determined that developing an innovative approach to the delivery of climate risk information for farmers in Andhra Pradesh presents challenges in relation to the provision of information on innovative 'eLearning' systems and climate and agricultural sciences. Farmer workshops were fundamental in obtaining ownership of these new systems and in obtaining feedback as to the likely future success of such technology. It is suggested that in developing new technology to deliver climate forecasting and associated outputs for farmers, social aspects in relation to farmer discussions, as well as delivering the core climate science output, must be addressed.

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1.0 Introduction

This section should include background information, scientific significance, objectives, and other relevant information leading to the development and justification of the current project.

There has been a strong background in the delivery of complex climate science and decision system information in Australia which has led to an improved understanding of the need for direct interaction between climate scientists and the eventual (end) users of climate information, especially climate forecast information. Additionally, the UN World Meteorological Organisation's Commission (WMO) for Agricultural Meteorology (CAgM) has purposely enhanced the identification of the immense challenge required in providing climate forecast information (including, potentially, climate change information) for 'real-world' farmers in developing countries. With this background, a key aspect of this project was to start to attempt a means of addressing this challenge: how to effectively accomplish this task?

However, over the past decade, the University of Southern Queensland has won numerous awards related to distance learning and education, especially through the use of innovative web-based learning devices such as '2nd Life' and 'eLearning' (deLucia et al., 2009; Salmon, 2009).

Through useful interaction with both BoM and IMD as well as participating in WMO CAgM workshops, it was quickly realized that some potential may exist in linking all the above concepts together: lengthy and valuable experience in conducting climate workshops directly with farmers in the Australian bush; learning the value of direct interaction between climate scientists and farmers if farmers are to take climate science output seriously; developing an understanding of the breakthroughs now obtainable in innovative 'eLearning' in delivering what is known as 'discussion support' (as opposed or at least in addition to 'decision-support').

The scientific significance on this approach lies in the projects contribution to interdisciplinary systems development. There is a need to develop a more thorough understanding of the need for systems approaches in climate-related R&D. For too long, many in the climate science community have mistakenly believed that by simply providing climate forecast 'products', end-users will somehow automatically commence using such outputs. However, as Meinke and Stone (2005) point out, before managers and users of climate forecast information will begin using climate forecasts in an effective manner, an integrating mechanism, preferably involving interdisciplinary systems approaches is needed. Additionally, the outputs from such a combined and interdisciplinary, integrative system need to be provided to farmers through participative approaches such as user-orientated workshops in which active discussion takes place. Thus this project, while being cognizant of the major advances made in climate science over many years, also has a strong foundation in the social sciences, especially in the development of participative approaches in linking science with user ownership.

The core objectives of the project were, through the creation of a 'virtual' discussion-support system, to create and integrative climate variability/climate change/farming operations process and system. In this approach, systems were to be developed to:

- Utilise new developments in 'eLearning' whereby web-based avatars are constructed to portray farmer discussion-support processes,
- Utilise understanding of climate science outputs that may directly relevant to farming needs (such as likely monsoon rainfall and onset in India),
- Utilise the innovation in India of the creation of 'Internet Kiosks' in rural towns and villages,

- Create a seamless process whereby the latest knowledge related to climate forecasting output is translated through web-based ‘discussion-support’ to farmer-based environments in India,
- Learn from the challenges provided, workshop feedback, and technology issues better ways to provide ‘discussion-support’ environments to a wider global farming need.

Associated objective were to:

- Bring together top researchers in the fields of climate science, agricultural applications and innovative web-learning participatory discussion-support systems in order to develop new systems in the delivery of vital climate related farming support for India.
- Provide the key objective of creating new forms of decision-support through a ‘virtual’ discussion-support-system that will integrate forecasts of climate variability and climate change (at a range of scales) with practical farming operations.
- Utilise the recent breakthrough developments in web-based portals and eLearning systems but focused on real-world issues related, in this project, on aspects associated with farming decisions in selected regions in India.
- Develop a system for farmers in regional India by utilising the newly developed and extensive regional internet kiosk network now being made available by the Government of India.
- Following site and research centre visits, (primarily in Andhra Pradesh) to provide a series of focused workshops that will aim to capture user (farmer) needs in the field of climate forecast-climate change oriented agricultural decision making for their location and region.
- Build upon previous excellent work in this area (e.g. work of Meinke, Nelson, Hansen) with the aim of providing discussion frameworks through web portals in much the same manner as may otherwise have to be achieved through a large number of locally delivered participatory workshops delivered in the field on an extensive on-going basis,
- Capture both the innovative development of internet kiosks in India as well as the innovative development of new aspects of eLearning at the University of Southern Queensland.

2.0 Methodology

(Explain how you carried out the project, which should follow logically from the aims. Depending on the kind of data, this section may contain subsections on experimental details, materials used, data collection/sources, analytical or statistical techniques employed, study field areas, etc. Provide sufficient detail for a technical/scientific audience to appreciate what you did. Include flowcharts, maps or tables if they aid clarity or brevity).

The aims of this project were, through the creation of a ‘virtual’ discussion-support system based on ‘Second Life and eLearning technologies, to create and integrative climate variability/climate change/farming operations process and system – in this case study for a relatively remote farming region of India.

In particular, utilization of Second Life (2nd Life) technology was fundamental to the concepts behind and eventual success of the project. Thus the project sought to utilise 2nd Life technology within a real-world farming extension situation in India and to bring together climate science, climate scientists, educational scientists, agronomists, extension specialists and ‘real farmers’ in order to derive the most appropriate means of integrating 2nd Life technology into a discussion-support framework.

From the outset, the project sought to capture the needs of the farmer/users and extension specialists in Andhra Pradesh (rather than be science driven). To accomplish this aim, a series of workshops was developed with both scientists and extension specialists in mind and also with leading farmers of the region in mind.

Outputs from the workshops were used to frame the construction of the discussion-support, 2nd Life, videos.

Second Life (2nd Life) is, what is known as, “a three-dimensional multi-user environment. In particular, this approach provides realistic settings, the exploitation of pleasant simulated environments for groups and links with other technologies. This approach is also known for pointing to infinite imaginative educational possibilities where aspects can include virtual representations of ‘learners and teachers’ as avatars” (Salmon, 2009).

“eLearning is learning that takes place in the context of using the internet and associated web-based applications as the delivery medium for the learning.” In this:

- E-learning can ensure broad and equitable access to skills development
- E-learning is flexible and can be instantly adapted to meet stakeholder needs
- E-learning can complement and enhance other methods or systems of instruction
- E-learning has demonstrated cost efficiency for training in the private sector (McKeown, 2010)

In particular, McKeown (2010) points out that the ‘Maestro eLearning Pyramid’ moves the user/farmer from simple, passive reading of relevant text through to discussions and making a decision – key attributes required of a ‘discussion-support’ system for farmers. Figure 1 provides an illustration of this ‘eLearning Pyramid’ (copyright: Maestro eLearning).

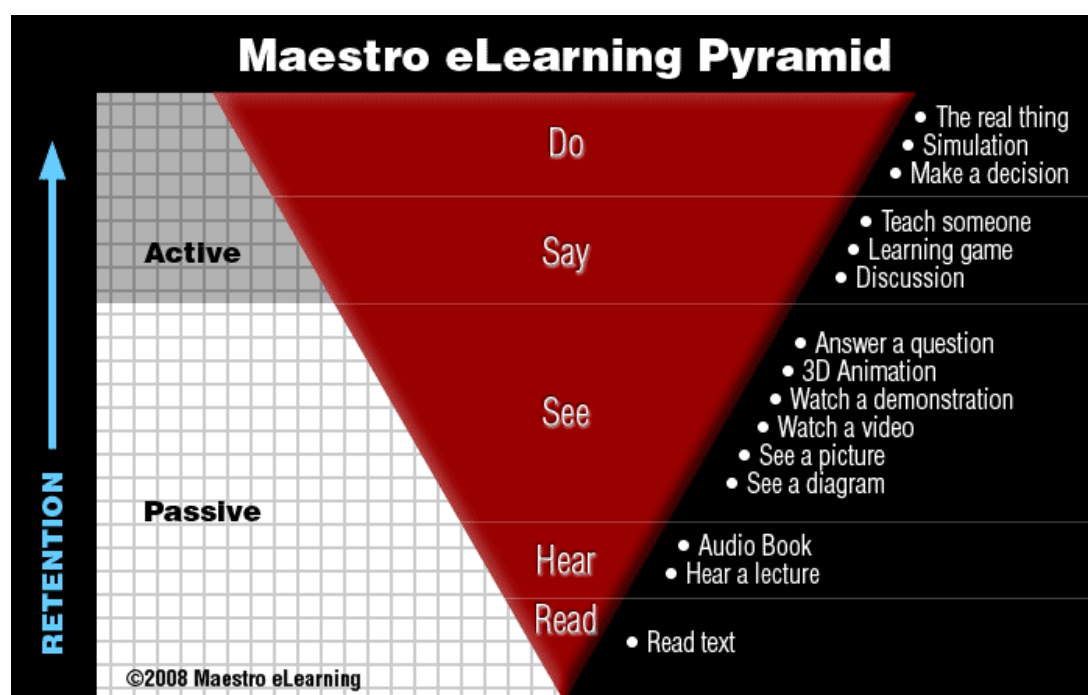


Figure 1. Depiction of the eLearning pyramid – courtesy Maestro eLearning.

Additionally, USQ Online Extension-Development has proven valuable over recent years as it provides an online discussion support tool for users (e.g. in this project this would be for farmers), and has enabled real time discussion (SMS alerts/synchronous chats), specifically allows discussion prompts/scenarios driven by climate-based information, and can provide

- *SOI/climate indicator fluctuations/etc*
- *Production of climate/agricultural-relevant scripts and scenarios*

This USQ Online Extension system is able to use 2nd Life systems to replicate simulated farming environments. It is also able to address cultural and language issues.

Additionally, avatar approaches have value as they provide a location in the sense of a place to learn and meet. This approach allows distance learning, the hosting of events, the placement of 'guest speakers and experts' (e.g. in this project, climate or systems modelling experts), and is available to all 'students' or those who wish to investigate the outputs. This approach also has context in that the characters (farmers, agronomists, extension specialists) are able to be shown as lifelike and 'virtually' real. This approach is able to manipulate and create digital materials for creative expression, machinima (film making) & visualization similar to 'real-world' situations. This approach allows the developer to create various combinations – allows the mixing and matching of various roles in order to create authentic tasks, improve presence for the distance learners (farmers), and to generally improve communication or connect to a wider audience (McKeown, 2010).

The approach to discussion-support systems follows the context observed by McCown et al. (2002) that addressed the issue of the gap between computerized decision-support systems and farmer decisions in Australia. In particular, Nelson et al. (2002) carefully observed that while seasonal climate forecasting offered major potential for improving management of crop production risks, the capability to connect this newly developing area of science in 'real-world' management practice remains a major problem. Hansen (2002) also explained, 'the information in climate forecasts is useful only to the extent that it addresses a need that is both real and perceived...the primary motivation for individual farmers is an awareness of some level of vulnerability to impacts of climate variability, and opportunity to reduce that vulnerability through appropriate use of forecast information'.

Nelson et al. (2002) suggested that discussion-support outputs are essentially about moving beyond traditional notions of supply-driven decision-support systems. They argue that discussion-support software and approaches is largely and importantly *demand-driven* and can have enormous value by complimenting participatory action research efforts that are often led by extension specialists in delivering climate forecasts and associated relevant farm management actions. They suggest that, in this framework, there exists a critical role of farm management advisers and dialogue among key players. For this reason, a key component of the process developed for this project was to involve extension specialists from ANGRAU and advisers in the local region to interact with farmers in Biranpalli.

The notion of strong stakeholder partnerships to generate aspects and inputs which is of direct relevance of research and analysis to decision-makers has emerged as a common theme in discussions on effective intervention in farming practice (Hammer, 2000; Keating and McCown, 2001; Meinke et al., 2001; McCown, 2001; Everingham et al., 2002; Ingram et al., 2002).

Study region

India experiences a highly variable climate, especially in its major farming regions. Climatic variability, especially with its resulting risk of financial loss in poor years, is cited as a key reason for

under-investment in soil fertility inputs in rain-fed production systems in India (Hansen, 2002; Gadgil et al., 2002). On the other hand, these authors also point out that the risk-averse farmer is likely to have greater flexibility and therefore greater opportunity to benefit from reduced downside risk associated with favourable climate forecasts than from equally skilful forecasts of unfavourable climatic conditions. They point out that highly variable crop yields (e.g. cotton, chickpeas, mungbeans) and associated farm incomes frequently threaten the economic viability of these cropping systems and the highly dependent associated rural communities.

Hansen (2002) suggests that research efforts aimed at fostering beneficial agricultural use of seasonal climate prediction needs to begin with careful and systematic attempts to answer a range of questions regarding decision makers, their needs and perceptions, especially their decision-making capacity (Figure 2). Additionally, Hansen (2002) notes that in many cases, farmers evaluate the credibility of information and advice based on its source (e.g. Ingram et al., 2002) and that they are most likely to act on information when it comes from sources that they already know and trust. Hansen (2002) also suggests that it is important to involve trusted agricultural advisors in early stages of planning such projects and activity and this can be a precondition to gaining 'entree to agricultural communities'. In this respect, it is important that a *sense of ownership on the part of the same advisors* can be crucial to long-term success (Jagtap et al., 2002; Hansen, 2002).

Local knowledge and input from climate and farming systems specialists in India (at IMD and ANGRAU University) provided critical input as to the likely most suitable region and location for this study and project. In particular, cotton and grain farmers at Biranpalli together with those farmers who were known to the local Internet Kiosk were chosen in this case study project. This selection process was also made in order to ensure farmers of sufficient knowledge and experience would take part in the project and who would have appropriate farming systems and decisions in place to take advantage of the information provided.

Hansen (2002) had noted that while a focused pilot project might initiate use of seasonal climate forecasting to the benefit of a small target group of decision-makers (e.g. local farmers), continued benefits beyond the life and scope of a project would depend on the capacity and commitment of the relevant institutions that would be needed to provide the fundamental resources in seasonal forecast applications for agricultural decision-making. For this reason, concerted effort was made to engage with India Meteorological Department and both ANGRAU University and University of Southern Queensland.

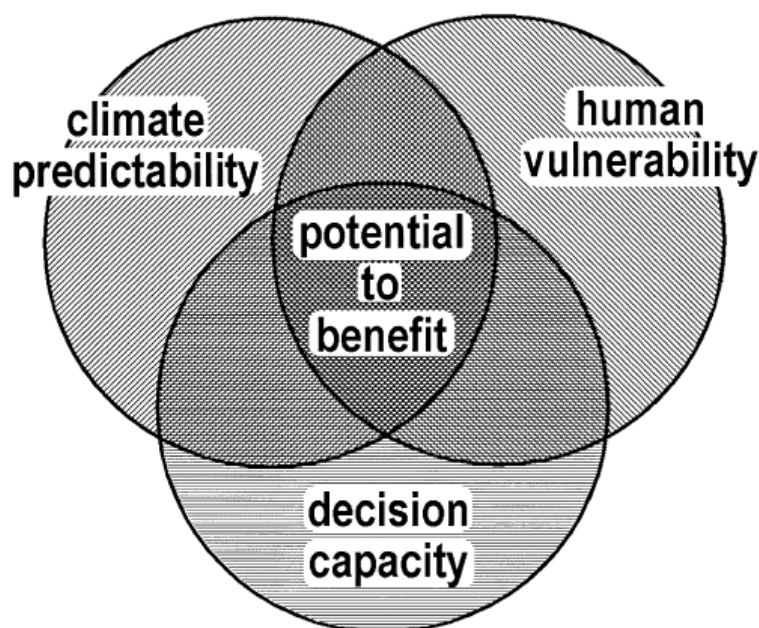


Figure 2. Determinants of the potential for human populations to benefit from seasonal climate prediction – with permission, Hansen (2002)

Additionally, in Australia and India, there has been on-going discussion about the most effective process for connecting climate-cropping systems analysis of various kinds with day-to-day farm management practice for many years (Cox, 1996; Hammer, 2000; Keating and McCown, 2001; Meinke et al., 2001; McCown, 2001; Meinke and Stone, 2005; Stone and Meinke, 2005). Nelson et al. (2002) demonstrated that the use of participative systems approaches over many years involving simulation-aided discussion with advisers and decision-makers has led to the development of discussion-support systems or software as a key and perhaps fundamental vehicle for facilitating the 'infusion of climate forecasting science' and associated output into practice.

Thus, it was considered appropriate and somewhat overdue to ensure user-oriented participatory workshops would be a prime method in assessing the provision of input and value of development of new forms of climate-forecast delivery such as 2nd Life and eLearning in a discussion-support environment in a country and region such as India. Also, it was considered important to include strong participation of local agricultural expert scientists who already had established high-level farmer confidence. Additionally, it was considered important to strongly include agricultural scientists who were well-known and respected by farmers in Andhra Pradesh in this project. Furthermore, senior representatives from India Meteorological Department were invited to participate in user workshops in farmer's local villages in this project. Additionally, Professor Stone has become known to both climate and agricultural scientists in India so that farmer and scientist credibility in the process would be achieved.

Additionally, prediction of the relevant components of weather or climate variability is needed for relevant periods, at an appropriate scale, with sufficient accuracy and lead time, in a form that can be applied to the farmer's decision problems (Stone and Meinke, 2007).

In regions where there has been successful uptake of more complex climate and weather information by farmers it has been important for farmers to participate in the development of

appropriate response strategies to climate and weather information, especially in deciding which decisions related to climate forecast information may be suited for them. In this respect, farmers may be suspicious of a forecast (system) if they do not understand or have some ownership of the scientific methods used to develop it, especially if they see the forecast as conflicting with their local traditional indicators (Patt and Gwata, 2002; Stone and Meinke, 2007).

In a study of seasonal climate forecasting applications for farmers in widely varying regions such as West Africa, India, and Australia it has been noted that, while farmers were generally interested in receiving seasonal rainfall forecasts that provided the probability of receiving a total rainfall amount in millimetres over their farming season, they were much more interested in receiving forecasts that were more relevant to their actual decisions. This, for instance, could include the timing of commencement and cessation of the wet season, whether there would be interruptions in rains, and whether the time period used as output from the forecast system was relevant... It appears to be the case that once this level of additional detail is provided, especially following use of participative approaches with farmers, they come to regard climate forecasts and weather forecasts as capable of providing useful input into their key management decisions (Gadgil et al. 2002; Everingham et al. 2002; Ingram et al. 2002; Stone and Meinke, 2007).

Data collection

As the project was largely aimed at the development of innovative discussion-support systems through use of the eLearning/2nd Life system, direct data input was mainly associated with documented feedback from those engaged in both the farmer workshops held in villages in Andhra Pradesh and those engaged in expert scientific workshops and meetings held at ANGRAU and at Tamil Nadu University. These data consisted of documented phrases and quotes from farmers and scientists/extension specialists.

In detail, these data collection points consisted of:

- Documented proceedings from farmer and agronomist feedback at Internet Kiosks where farmers gathered,
- Documented proceedings from farmer and agronomist feedback at village workshops held in Biranpalli,
- Documented proceeding and feedback obtained from specialist agronomists, extension specialists and climate scientists who attended workshops and meetings held in Hyderabad (ANGRAU) and Coimbatore (TNAU). This feedback included that obtained from senior India Meteorological Department (IMD) climate scientist, Dr K.K. Singh, who kindly attended both the specialist workshop at ANGRAU and the 1st farmer workshop at Biranpalli and provided valuable feedback from these interactions.

3.0 Results & Discussion

Results of this pilot project are primarily the outputs as comments from the farmers and extension specialists themselves together with the actual videos that have been produced that have attempted to create a synthetic 'discussion-support' environment (Figure 3).



Figure 3. Participants attending the first farmer and extension specialist workshop held in Biranpalli, Andhra Pradesh, September, 2010.

The outputs from the videos are provided as attachments in the Appendix.

This 'case study, proof of concept project' established that it was possible to provide such videos in a 'real-world' setting such as relate ? to the climate patterns unfolding in 2010/2011. This type of output required the close collaboration between climate scientists (Prof Roger Stone, Dr K.K. Singh) with specialist agronomists (Dr R. Reddy), 2nd Life/eLearning specialists, (e.g.: Dr L McKeown), and software and video production specialists - in this case those employed at the University of Southern Queensland.

While this overall team may appear large, considering the many hundreds of millions of farmers in India and the resources that would otherwise be required to provide such specialist knowledge and interaction, it is suggested the project has established the cost effectiveness and scientific and management effectiveness of the proposed approach.

Figure 4 provides an example and depiction of the liaison and participatory workshop feedback process carried out between climate scientists, specialist agronomists, distance learning and extension specialists.



Figure 4. Depiction of the farmer-oriented, participatory workshop process underway in Biranpalli, Andhra Pradesh, September, 2010. This workshop provided an illustration of the liaison required between climate scientists (Prof Stone and Dr Singh – centre and far right), specialist agronomists (Dr Reddy – seated next to Prof Stone), and distance learning and extension specialists (Dr McKeown and Dr Sreenivas). Note the background banner describing the project in the local Telugu language.

The project established that it is possible, through focused site visits and participatory interaction with farmers as decision makers, together with key agronomists and extension specialists resident in the area, that vital climate forecast information can be effectively provided within a synthetic eLearning but carefully considered discussion-support environment that will be of value to the farmers making decisions - in the region where the case study was conducted but also relevant to similar environments and regions.

We were surprised by some aspects of the feedback result from the participatory workshops regarding dress and numbers of participants portrayed in the eLearning/2nd Life videos. However, this feedback proved to demonstrate that users could easily be put-off and distracted by somewhat peripheral aspects (to scientists) not directly related to the core science message.

In other words, having 2nd Life/eLearning avatar figures not looking or behaving as they would in a real-world village scene serves as an immediate distraction from other important aspects of such discussion-support videos and can also suggest lack of attention to detail that may reflect on other (more serious) aspects of outputs. In other words the results of this project suggest that in creating synthetic actors engaged in a discussion process involving core science and management inputs it is important to get all and every component correct – the entire scene and all characters involved or even peripheral to the process must be completely realistic otherwise the entire process could fail.

This result also highlights the need to see such output from the farmer's point of view and not the research provider's point of view if such output is to prove successful.

Other aspects from user participatory feedback on the project and its development included:

- There is a need to provide videos in a number of languages – in this case three videos were initially created in three languages relevant to Andhra Pradesh – Telugu (local language), Hindi, (broader language for India) and English (a language of commerce and government).
- There is a need for close interaction as possible with farmers in both a village setting and 'on-farm'...this requires 'walking and talking' with key farmers in order to create a sense of trust and understanding with the farmers in the target region,
- There is a need for close interaction with the media – the media in such an environment will quickly learn of these developments and will carry such developments on local news bulletins and in newspaper articles – it is important to establish rapport with local media. In this pilot project, this rapport with local media was made at both the village workshop level between the climate scientists involved (Prof Stone, Dr K.K. Singh) but also the agronomists/extension specialists (Dr Sreenivas, Dr Reddy and others). Figure 5 provides an example of this interaction with the local media.



Figure 5. Professor Roger Stone at Biranpalli (September, 2010) providing an interview with a local television station on the background of this project together with the need to develop more effective systems for discussion support in such an environment.

In this respect, the results of the interaction processes utilised in this project pointed to the strong need for climate scientists who are engaged in climate forecast extension to seek 'ownership' of the

entire process by the local extension specialists and agricultural scientists in the region. Otherwise, the climate science and forecast outputs could be regarded as separate from the actual farmer needs and decision-processes.

Feedback from the participatory workshops also established the need to have credibility in the science portrayed. The evidence for this may simply be in the level of scientific status the visiting climate scientist may hold (through previous media coverage etc) but also through the need for the climate scientists to talk openly at the farmer workshops on the science they have developed or work with, how the science has been developed and how it may add value to the farming systems in the region.

Key aspects of the results of feedback processes were that participants from the initial user-orientated workshops were critical of the following features:

- There is a direct need for the utmost detail to be portrayed (e.g. in addition to the detail on climate science outputs, aspects related to village life portrayed and farmer characteristics are needed) in what will be provided in avatar/2nd Life video discussion-support system outputs that show farmers in India discussing climate risk and farming practice,
- Besides the direct need for careful appraisal of the climate science and climate forecast inputs - which could be considered a climate science-driven perspective but which are nonetheless important - is the fundamental need in farmer discussion-support system outputs, such as 2nd Life/avatar figures who are shown to be engaged in discussion, to consider all of the following:
 - the farmer's dress,
 - their exact language used in the region (in this case it was Telugu),
 - how is their sense of humour portrayed in farmer banter about such issues and topics (it is suggested such humour and banter is common amongst farmers, globally, especially regarding knowledge of weather and climate) (as an example, see Figure 6),
 - the age of the (synthetic) 2nd Life participants portrayed in the videos - it is important to not make them appear too young (also Figure 6),
 - the number of participants in the discussion-support videos - do not make them too few (see also Figure 6 as an example of the numbers of participants normally engaged in such discussions),
 - the types of housing in the background of the video - make it realistic (also Figure 6),
 - the types of machinery (or lack of machinery) in the background of the discussion-support video,
 - need for a clear understanding of the farming systems in use in that particular region to be discussed by the 'farmers' in the discussion-support videos,
 - need for a clear understanding of the types of crops grown in the region for discussion and also in background scenes in the discussion-support videos (Figure 7),
 - need for a clear understanding of the 'big issues' the farmers have had over recent years (e.g. drought, excessive rain) in order to establish relevance and credibility in the discussion-support videos,
 - need to establish what capacity farmers may actually have to use as? climate forecasts,
 - what local politics are evident that may hamper or assist local ownership of climate forecast information and consider the need to portray these aspects in the discussion-support video (e.g.: who is in charge of the village, who are the local 'champion farmers' who will provide 'clearance' of use of such information as climate forecasts),

- ensure appropriate electronic display facilities are available for farmer use – both at participatory workshops and for later application (e.g.: video projection, local village television).



Figure 6. Example of farmer interaction during the delivery of discussion-support opportunities to the local needs. Feedback from the user-oriented workshops highlighted the need to capture the local sense of ‘humour and banter’ of the local farmers if the linkages between climate science and farmer decisions were to appear realistic in development of eLearning videos and approaches.



Figure 7. Developing a close understanding of a farmer's actual problems and issues that may be impacted by climate variability and change – an example of farmer interaction carried out as part of this project - major cotton farm, Biranpalli, Andhra Pradesh, September, 2010. In this instance aspects related to pest outbreaks associated with an excessively wet monsoon season were highlighted as an important management decision that needed to be addressed in the development of 2nd Life/distance learning discussion-support systems related to climate forecasting. Shown in the foreground are leading specialists in agronomy and extension (from left) Dr Raji Reddy and Dr Sreenivas, ANGRAU, Hyderabad.

In addition to the above, regarding the practical creation of such eLearning/2nd Life/avatars as synthetic discussion support systems, the project identified and collated the following feedback from 'eLearning and distance education' specialists as follows:

- a professional film maker needs to be involved in the overall process in addition to the avatar creator if these new learning systems are to 'really work',
- in the synthetic role-playing component of the 'eLearning discussion support system', the characters all need to face 'the camera' as much as possible and not have one character viewed from the back all the time,
- it is useful and efficient to use similar props throughout (e.g. 2 blue bikes of the type on which the farmers would ride into the village),
- it is important to make sure new characters just don't appear – in one script a 3rd farmer 'just appeared' as part of the discussion and this has to be avoided,
- there is a need to work on the transitions of real characters into discussion scenes,
- there is a need to have numerous background people in the synthetic discussion scenes, especially for an audience in India – farmer feedback strongly suggests the need for

additional people to the core synthetic farmer/actors 'looking on' and listening to the created conversations about climate forecasts and likely issues to do with crop management ahead. This project ascertained just how important this interaction on such relevant issues such as climate and farming takes place in India.

Broad Generalisations

As the project was largely concerned with aspects such as workshop interaction, participative participation by both end-users and intermediaries, as well as development of eLearning techniques using 2nd Life avatars to create a 'virtual discussion support' system, there were key outcomes that, it is believed, have general application to discussion-support systems development, especially those related to climate variability, climate change, and climate forecasting.

In particular, it was noted, as per Nelson et al. (2002), that the facilitator plays a central role in farmer workshop activity of this type. In this project, both Dr Raji Reddy and Dr Sreenivas (ANGRAU) played a critical role in helping to structure the problem areas to be considered – this extended from both the 'expert' workshop' structure in Hyderabad and then to farmer workshop facilitation (as someone local who could be 'trusted') - to moderating the dialogue over the particular management problems farmers in Biranpalli had to confront. This approach fitted well the concepts raised by Cliffe (1999), Chapman (1999), and Nelson et al. (2002) that this method would significantly enhance group learning. It was observed that the same outcomes occurred in Biranpalli, Andhra Pradesh as have occurred in the Australian farming environment where climate risk management workshops are held with local farmers (see Cliffe, 1999).

The approach of introducing aspects as potentially complex as climate science, climate forecasting, risk management and innovative delivery methods (use of 'eLearning' to create synthetic discussion support scenes) reinforced comments made by Nelson et al. (2002) that discussion-support is about moving beyond decision-support. The discussion-support process, at first initiated through the farmer workshops but then trialed in the use of 2nd Life avatars and eLearning, clearly aimed to facilitate dialogue and actually show dialogue on-screen that farmers in Biranpalli could then relate to. In this respect, considerable effort was made to avoid the concept of supply-driven decision-support. In this respect considerable effort was also made to avoid scientist-driven packages of information that they (we) believe should be valuable and useful for farm managers.

Additionally, considerable care was taken not to focus too much on the technology of decision-support - in this case through the innovation of 2nd Life avatars. For this reason many hours and days were spent with the farmers in Biranpalli and surrounding regions and towns in order to exchange information on their critical decisions, which largely focused on the start and strength of the coming monsoon season. Nevertheless, as Nelson et al. (2002) and others have noted, aspects of the innovation of the science breakthroughs also need to be considered and recognised where possible in this overall process, so that the farmers are aware of the fundamental need for their input and ownership of the process but also aware of the long history and effort made in the development of the climate science outputs (Keating and McCown, 2001; Nelson et al., 2002).

In this respect, this pilot project reinforced the concepts raised by Hansen (2001) that the effective implementation of seasonal climate forecasts requires that the target audience receives and correctly interprets the right information (at the correct time!). This output needs to be in a form that is relevant to the decision problem and compatible with the decision process. Thus an aspect of this project was that effort must be made to ensure correctness of the information and the complexities of the whole communication process from initial farmer-orientated workshops right

through to development of new technology avatars/2nd Life communication outputs. In this study, aspects related to information needs were carefully appraised in order to distinguish between climate forecast (and weather) information that might be generally desired and that type of forecast information that would actually influence their decisions (Hansen, 2001).

This pilot project also highlighted the need to attempt to recognize site specificity and that the climate forecast output may not directly fit their need to manage their farms and fields. Very importantly, feedback from discussions held with extension specialists, agronomists and farmers stressed the need for timeliness in outputs that are clearly relevant to the farmers and agronomists decision timetable. In this respect, the only feature that severely captures the users interested in Andhra Pradesh is the timing of the onset and strength of the main monsoon season. Discussion and output related to climate patterns at other times or seasons of the year ‘fell of deaf ears’ (see also Hansen (2001).

Another important outcome from this pilot project and the feedback obtained from the workshops was the need to recognize the very important role of the agronomist and extension specialists in translating the climate forecast information into the farmer’s language (and this includes translation of probabilistic information) and to provide the linkage mechanism between the climate scientist and farmer, long after the climate specialist has left the workshop and discussion environment. Thus both the straightforward climate forecast information output from climate science providers plus an interpreted farmer/agronomist version of the climate forecast output appears to be optimal (e.g.: Hammer, et al., 2001; Hansen, 2001).

4.0 Conclusions

The key objective of this project was to assess the capability of 2nd Life/eLearning education systems in creating ‘virtual’ discussion-support systems for a relatively remote but important farming system and users in India. The key questions were: could such a an innovative process be achievable; could relatively complex scientific systems such as climate forecasting and farming decision-systems be captured in such a process, would such a process be accepted by local farmers; would such a process be completely relevant and capable of capturing real-world climate patterns and forecasts.

Without the considerable assistance of colleagues at ACHARYA N.G. RANGA Agricultural University (ANGRAU) and Tamil Nadu Agricultural University (TNAU) as well as at IMD, the project would not have been successful. It is believed it is imperative that local experts be involved in processes that require a strong participatory workshop component and also a strong knowledge of the local farming systems. With this type of collaboration, it is possible for specialist educational and climate science teams (such as those at the University of Southern Queensland (USQ)) to produce such innovative discussion-support videos that have the strong potential to aid farmer decisions related to climate variability and output of climate forecasts. It is believed a development of the above approach would be to eventually include aspects related to long-term climate change, but only though first testing concepts through participatory workshops.

The project also reinforced the need for highly effective participative workshops involving farmers, local/regional extension and agronomist specialists, as well as highly regards climate scientists if uptake of climate forecasts and projections is ever to be accepted in real-world decision environments.

In conclusion, it is believed the innovative education approaches developed can provide effective means of enhancing discussion-support in relation to climate variability, climate forecasting and real-world farmer decisions. However, the attention to every detail is paramount.

5.0 Future Directions

In many instances it is believed the farmers present at these workshops have already gained ownership of important aspects of climate forecasting and how links are made to farming decisions. This outcome has been achieved in this region because the forecast outputs and climate science were made relevant to the farmer's own location and farming experience. It is believed, in the longer term, improved understanding of climate forecasts and links to farm decisions will also lead to an enhanced capacity for increased food production and enhanced food security in the region. However, another fundamental outcome of this project is the recognition that more needs to be done in terms of provision of even greater attention to detail in the production of the videos if this discussion-support approach is to be viable (for farmers) in the longer-term. It is also considered important that the institutions involved in the project need to ensure that the infrastructure currently in place remains so that ongoing development of the processes can be made.

It is believed there is considerable scope for further development of this approach for other world regions as well as for other regions and farming environments in India. Outputs from this project have been presented to UN WMO Commission for Agricultural Meteorology workshops and meetings with positive support received. Potential for further development of this approach is possible through new project development being prepared by the US Department of Agriculture for a more comprehensive discussion support system for Africa.

Please note that a further workshop, specifically planned to fit the decision framework of the local farmers in Andhra Pradesh regarding the forthcoming monsoon season, is planned for June, 2011.

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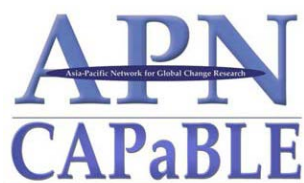
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Appendix



Workshop Agenda ANGRAU APN WORKSHOP 28 SEPTEMBER, 2010, ANGRAU, Hyderabad.

1. Welcome: Prof Roger C Stone, University of Southern Queensland, Australia;
Welcome address by invited dignitaries: ANGRAU, ANGRAU Agricultural Extension; India Meteorological Department, TNAU.
2. An Overview presentation on the Project and Purpose of the Workshop, especially regarding what we all wish to achieve by the end of the day? (Prof Roger Stone)
3. An overview presentation on the breakthroughs in 'eLearning' in distance education (Dr Lindy McKeown, University of Southern Queensland, Australia).
4. 'What is required to make this innovative system workable? How do we gather all the required data? Who in the community can assist in writing the 'scripts'? (Dr Lindy McKeown; Prof Roger Stone, University of Southern Queensland, Australia).
5. A description of key farming systems in the case study region. (Dr Raji Reddy ANGRAU or delegate).
6. Key management issues related to climate and weather for farming systems in the case study region. (Dr Raji Reddy or delegate).

7. What are the key climate and weather factors affecting farming in the Andhra Pradesh region? (IMD specialist delegate).
8. What are the key 'decision points' for farming in the case study region? (Dr Raji Reddy or farmer/ extension specialists as you nominate).
9. How can climate and weather forecasting and information fit into those decision points? (Prof Roger Stone and invitation for all participants to provide input).
10. What more needs to be done to make sure this is a successful project? (Prof Roger Stone)

Participating Guests

Dr. P. Raghava Reddy, Vice-Chancellor,
ANGRAU

Dr. R. Sudhakar, Director of Research, ANGRAU

V. Gopala Krishna, Senior Scientist, DAATTC,
Nalgonda

Dr. P. Punna Rao, DDG, ANGRAU

Dr. G. Veerendranath, PAIO i/c, AI & CC

Dr. P. Jamuel PC, KUK, Amadalavalasa

Dr. B. Bhaskar Reddy, Professor IIIT,
Hyderabad

P. Krishna Reddy IIIT, Hyderabad

M. V. Satish Kumar, Deputy Director EDS
(eSeva), Banjara Hills, Hyderabad

K. Rakesh EDS (eSeva), Banjara Hills,
Hyderabad

K. Suresh WASSAN, Tarnaka, Secunderabad

M. Janardhan Pilupu, Bhongir

M. Padma Reddy Pilupu, Bhongir

P. Adi Reddy, RA (Horti.) KVK, Adilabad

Dr. E. Karuna Sree K.V.K. Jammikunta,

K. Ramachandraiah Bairanpally

P. Venkat Reddy Nemmani

P. Bhagavanth Reddy Gorita

M. Gopal Reddy Ippalapally

G. Krishna Reddy Gorita

G. Govardhani IPWWA-Jadcherla

B. Nagaraju Bairanpally

Dr. D. Raji Reddy, Principal Scientist (Agromet.)
& Head Agromet-Cell, ARI, Rajendranagar

Dr. G. Sreenivas, Senior Scientist (Agronomy)
Agromet-Cell, ARI, Rajendranagar

Rajender Kulla, SRF Agromet-Cell, ARI,
Rajendranagar

D. Narender Babu, SRF Agromet-Cell, ARI,
Rajendranagar

Smt.A. Madhavi Lata, Scientist (Agronomy)
Agromet-Cell, ARI, Rajendranagar

Dr. K. Vijaya Lakshmi, Senior Scientist
(Entomology) Agromet-Cell, ARI,
Rajendranagar

A. Kamalakar Reddy, SRF Agromet-Cell, ARI,

Karimnagar

B. Vijayalakshmi C-DAC, Hyderabad

T.V.K. Singh, ADR RARS, STZ, Palem

R.S. Reddy, Co-ordinator Electronic Wing
Rajendranagar

K. Venkata Raju, EDS (eSeva), Banjara Hills,
Hyderabad

N. Sudhakar Reddy, Secretary Shanthi Service
Society, Warangal

Ch. Narender Reddy Shanthi Service Society,
Warangal

Rajendranagar

P. Linga Reddy, SRF Agromet-Cell, ARI,
Rajendranagar

Roger Stone Southern Queensland

Linday Mekown Southern Queensland

Dr. Venkateshwarlu CRIDA

Dr. K.K. Singh IMD, Pune

Dr. V.U.M. Rao, Project Coordinator Agromet
Scheme

Workshop: Biranpalli Village Farmers Meeting Hall, Andhra Pradesh, 11am 29 September, 2010.

Agenda:

Welcome to all farmers and specialists: Dr Raji Reddy

Background and Purpose of the project: Dr Raji Reddy

Speech by Prof Stone.

Value to farmers: Dr Sreenivas

Feedback to workshop: Dr Reddy; Dr Sreenivas.

Visit to local farms – discussion with champion farmers – Dr Reddy and staff.

1500 close.

Participating Guests

Prof. Roger Stone, University of Southern
Queensland

Dr. Lindy Mekeown, University of Southern
Queensland

Dr. D. Raji Reddy, Principal Scientist, Agromet

Dr.Srinivas, Sr.Scientist, Agromet

Dr.Masood, Department of Agriculture
Dr. Venkatraju, EDS

Dr.K.K. Singh, IMD. New Delhi

Dr.Vishnu Vardhan Reddy, Associate Director-
ARS, Warangal

Dr.Uma Reddy, Co-ordinator, DATT Center,
Warangal

Praveen, General Manager, E.Sea

N.Sudhakar Reddy, Secretary, Shanthi Service
Society, Warangal

Participating Farmers

Bairi Ram Reddy
G.Karnakar Reddy
Bairi Samba Reddy
Bairi Naga Raju
Bairi Mahender Reddy

E.Raji Reddy

Ch.Rajender Reddy

T.Narsimha Reddy

Kunduru Samba Reddy

Junuru Satya Narayana

Ramidi Shankar Reddy

Bairi Raghupathi Reddy

M.Sridhar

Bairi Raji Reddy

G.Ilaiah

B.Madhu Sudhan, Co-ordinator, Shanthi Service Society, Warangal

K.Yakanarayana, Co-ordinator Shanthi Service Society, Warangal

Ch.Narender Reddy, Co-ordinator Shanthi Service Society, Warangal

D. Narender Babu, SRF, Agromet-Cell, ARI, Rajendranagar, Hyderabad

Rajender Kulla, SRF, Agromet-Cell, ARI, Rajendranagar, Hyderabad

A. Kamalakar Reddy, SRF, Agromet-Cell, ARI, Rajendranagar, Hyderabad

P. Linga Reddy, SRF, Agromet-Cell, ARI, Rajendranagar, Hyderabad

Ch.Shankar Reddy

Bairi Naveen Raju

Kunduru Adi Reddy

Bairi Ravinder Reddy

A.Kamalakar Reddy

Bairi Sambaiah

Bairi Mohan Reddy

B.Rajender

Junuru Rathnakar Reddy

Bairi Ranga Reddy

Kunduru Yella Reddy

Workshop: Biranpalli, Farmers Meeting Hall, Andhra Pradesh, 1330pm, 11th November, 2010

Agenda

Welcome to farmers and specialists: Dr Raji Reddy

Results of project so far: Prof Roger Stone

Feedback discussions with farmers: Dr Raji Reddy

Visit to local farms – discussions with champion farmers – Dr Sreenivas, Dr Reddy.

1600 close.

Designated Funding sources outside the APN

Agencies:

University of Southern Queensland – estimated input \$29,864 (this level of in-kind may increase as one more workshop is yet to be held in Biranpalli, June, 2011 to coincide with start of next monsoon season).
\$29,864

ANGRAU University - estimated in-kind input	\$9,000
India Meteorological Department, estimated in-kind input -	\$1,000
Tamil Nadu Agricultural University, estimated in-kind support -	\$1,000

List of Young Scientists

Mr Torben Marcussen, University of Southern Queensland (torben.marcussen@usq.edu.au).
Development of web-based systems and input into eLearning approach in the project.

Dr Shahbaz Mushtaq, University of Southern Queensland (shahbaz.mushtaq@usq.edu.au).
Development of concept frameworks for eLearning approach in the project.

“Working on this project has provided us with an exciting opportunity to integrate the research and application of climate science with the end user in an approach which could reach a greater proportion of farmers. Having developed a method for producing relevant and appropriate information in a relatively fast and less expensive way has been very rewarding and is sure to provide further opportunities for many other areas.”

Actors who took part in videos

Vijay Moore Sonypet (Haryana State)
Vishal Diwan, Amritsar (Punjab State)
Muhammad Salman Tahir, (Punjab State)
Umer Jilani, (Punjab State)
Vikram Chaitanya Vemuri, Andrapardesh (Hyderabad State)
Shiva Prasad N, Andrapardesh (Hyderabad State)
Deepak. G, Andrapardesh (Hyderabad State)

“This project has provided knowledge as well as experience on how today’s ‘elearning’ can play an active role in integrating the important issues of climate change affecting farmers decision in the selection of crops and their concern regarding various crop diseases. This project has focused on the importance of better understanding of climate system and its vast applications in agriculture water management as well as cropping choice. It has brought our attention to the fact of what kind of problems farmers have to face in terms of cropping decision, weather and climate information, financially, socially and how they cope with all the ups and downs of their lives. Another aspect of this conversation is farmers reliability on Indian Metrological Department (IMD) forecasts and their scientists. Overall it was a new and exciting experience of recording our voices which would be later heard and seen as an avatar by farmers across India.”

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APN Project
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Asia Pacific Network (APN) for Global Change Research Project

The Asia Pacific Network (APN) for global change research project facilitates the development of an interactive and customisable web-based climate portal. This portal will transmit and disseminate timely climate information to farmers in key regions of India.

The Indian Government, in providing thousands of computer terminals and facilities across regional India, provides enormous opportunity for this web-based initiative to improve the sustainability of Indian farming communities.

Project video



The APN project video depicts real-life climate-based scenarios through 2nd Life avatars challenging the participant farmers about on-farm decisions. Discussions are stimulated at farmer-oriented internet kiosks in agricultural regions in India and on line with farmers and support staff.

The climate and weather scenario video is available to view in several different languages:

- [English scenario video \(view transcript\)](#)
- [Hindi scenario video](#)
- [Telugu scenario video](#)

Further enquiries

For further information on the APN project please contact [Roger Stone](#).



Field inspection of cotton crops likely to be affected by adverse high rainfall. APN project participant from ANGRAU University, Dr Srinivas, together with key farmer participants engaged in the project. September, 29th, 2010.

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Dr Raji Reddy makes opening speech at 1st farmer workshop, Biranpalli Village, 28 September, 2010.



Participants at meeting and workshop with local farmers and industry representatives, held at Ragunathpalli Internet Kiosk, 28 September, 2010.



Formal presentations underway at ANGRAU University, Hyderabad, 28 September, 2010 (from left, Prof R Stone, University of Southern Queensland; Dr P. Raghava Reddy, ANGRAU; Dr R. Sudhakara Rao, ANGRAU).



Dr Raji Reddy (ANGRAU) provides formal presentation at the official workshop and project opening, ANGRAU, Hyderabad, 28 September, 2010.

Meet on agricultural climate at ANGRAU

The Acharya N.G. Ranga Agricultural University (ANGRAU), in association with the University of Queensland, Australia organised a Asia Pacific Network Project workshop on "Web based 'discussion support' on agricultural climate information for regional India" with an aim to derive input of local specialists' knowledge in agricultural climate systems by involving scientists, NGOs and farmers.

The other collaborators of the project were India Meteorological Department, New Delhi and Tamil Nadu Agricultural University, Coimbatore. The ANGRAU Vice Chancellor, P. Raghava Reddy and Roger Stone, Project leader, Professor in Climatology and water resources, University of Southern Queensland, Australia, briefed about the key points regarding the weather related climate risks impacting the agricultural systems and reiterated the importance

of developing web-based climate discussion support portals to transmit the vital climate information to farmers in key regions of India.

The ANGRAU Vice-Chancellor, P. Raghava Reddy addressed the need to synthesise relevant agricultural climate information related to climate change for the development of effective climate-discussion supports system to disseminate to the farming community to overcome the climate related crop production risks.

The Director of Research, R. Sudhakara Rao emphasised the need to identify key aspects of agro-climatic information and forecasts appropriate for farm decisions.

The Director of CRIDA, B. Venkateshwarlu stressed the need for the technical collaboration of National and International Climatologists for the creation of the virtual discussion support.

R. RAVIKANTH REDDY

Media interest (English language) in Project. The Hindu, Hyderabad, October 4th, 2010.

Below are media compilations from Telugu press, particularly in relation to Biranpalli workshop.

ఆంధ్రజ్యోతి

వరంగల్

20
పేజీలు



శుక్రవారం

12-11-2010

బైరాన్‌పల్లిలో ఇంటర్నెట్ ద్వారా వ్యవసాయ సూచనలు

వరంగల్ అగ్రికల్చర్, నవంబర్ 11 (ఆన్‌లైన్): వ్యవసాయ రంగంలో వస్తున్న మార్పులకనుగుణంగా తీసుకోవాల్సిన జాగ్రత్తలను ఇంటర్నెట్ ద్వారా రైతులకు చేరవేయడం వల్ల అధిక దిగుబడులు సాధించవచ్చునని, అంతర్జాతీయ వ్యవసాయ పరిశీలన కేంద్రం యూనివర్సిటీ ఆఫ్ నడరన్ క్విన్స్‌లాండ్ ఆస్ట్రేలియాకు చెందిన శాస్త్రవేత్త ప్రొఫెసర్ రోగోర్‌స్టాన్ అన్నారు. గురువారం హుసన్‌పర్తి మండలం బైరాన్‌పల్లి గ్రామంలో శాంతి స్వచ్ఛంద సంస్థ ఆధ్వర్యంలో ఇంటర్నెట్ ద్వారా వ్యవసాయ సమాచారంపై జరిగిన నడస్సులు ఆయన మాట్లాడారు. ప్రపంచ

వ్యాప్తంగా పంటల్లో బీడపీడలపై అధ్యయనం చేసి ప్రతి 15 రోజులకొకసారి రైతులకు ఇంటర్నెట్ ద్వారా సమాచారం అందించడం వల్ల రైతులు, ముందు జాగ్రత్త చర్యలు తీసుకునే అవకాశం ఉంటుందని చెప్పారు. డిన్ని పాల్ శాస్త్రవేత్త డాక్టర్ రాజిరెడ్డి మాట్లాడుతూ ప్రతి మంగళవారం శుక్రవారం రాబోయే నాలుగు రోజుల్లో వాతావరణంలో వచ్చే మార్పులను బులెటన్‌ల ద్వారా అందజేస్తున్నామని చెప్పారు. దీనివల్ల సమాచారాన్ని అవగాహన చేసుకుని అధిక దిగుబడులు సాధించవచ్చునని చెప్పారు. ఈ కార్యక్రమంలో వాతావరణ అధ్యయన కేంద్రం సీని



రైతులకు సూచనలిస్తున్న శాస్త్రవేత్తలు

యర్ సైంటిస్ట్ డాక్టర్ శ్రీనివాస్, శాంతి రెడ్డి, రమేష్, నరేందర్‌రెడ్డి, రైతులు సొసైటీ కార్యదర్శి నరహరి, సుధాకర్ పాల్గొన్నారు.

వరంగల్



వార్త

శుక్రవారం 12, నవంబర్ 2010

4 + 16 పేజీలు

వార్త

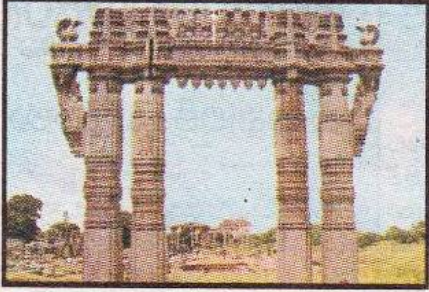


సూచనలు వివరిస్తున్న ఆస్ట్రేలియా శాస్త్రవేత్త రోగర్ స్టోన్

రైతులు లబ్ధిపొందాలి

జులైవాడ : ఇంటర్నెట్, వీడియో ప్రదర్శనల ద్వారా సస్యరక్షణ, రైతులకు వివిధ కార్యక్రమాలను వివరిస్తున్నామని, వీటి ద్వారా రైతులు లబ్ధి పొందాలని సదరన్ క్విన్స్ లాండ్ యూనివర్సిటీ (ఆస్ట్రేలియా) శాస్త్రవేత్త రోగర్ స్టోన్ అన్నారు. గురువారం నగరానికి చెందిన శాంతి స్వరూప్ సొసైటీ బైరాన్ పల్లిలో నిర్వహించిన కార్యక్రమంలో ఆయన పాల్గొన్నారు. ఎన్ జి రంగా యూనివర్సిటీకి చెందిన రాజిరెడ్డి, శాంతి సొసైటీ కార్యదర్శి సుధాకర్ రెడ్డిలు పాల్గొన్నారు.

వరంగల్



వార్త

గురువారం 30, సెప్టెంబర్ 2010

4 + 16 పేజీలు

నెట్ ద్వారా వ్యవసాయ కార్యక్రమం

జులైవాడ, సెప్టెంబర్ 29, ప్రభాతవార్త

ఇంటర్నెట్ ద్వారా ప్రపంచంలో మొదటి సారిగా భారతదేశంలోనే వాతావరణ ఆధారిత వ్యవసాయ కార్యక్రమం జరుగుతుందని ఆస్ట్రేలియాకు చెందిన ప్రొఫెసర్ రోగర్ స్టాన్ తెలిపారు. నగరానికి చెందిన శాంతి సర్వీస్ సొసైటీ బైరాన్ పల్లి గ్రామంలో బుధవారం నిర్వహించిన ఒక కార్యక్రమంలో ఆయన పాల్గొన్నారు. ఈ సందర్భంగా మాట్లాడుతూ ఈ గ్రామంతో పాటు నల్గొండ, మహబూబ్ నగర్ జిల్లాల్లోని ఒక్కో గ్రామంలో ఇంటర్నెట్ ద్వారా వాతావరణ వ్యవసాయ సూచనలు అందిస్తామని తెలిపారు. ఇ-సేవా కేంద్రాన్ని ఏర్పాటు చేసి అన్ని అంశాలు అందులో పొందుపరుస్తామని తెలిపారు. కార్యక్రమంలో ఆస్ట్రేలియాకు చెందిన లిండీ మెకాన్, శాంతి సర్వీస్ సొసైటీ అధ్యక్షుడు సుధాకర్ రెడ్డితో పాటు డాక్టర్ సింగ్, విష్ణువర్ధన్ రెడ్డి, ఉమ్మారెడ్డి తదితరులు పాల్గొన్నారు.



బైరాన్ పల్లిలో ప్రసంగిస్తున్న ఆస్ట్రేలియా రోగర్ స్టాన్

ఈనాడు

వరంగల్

గురువారం 30 సెప్టెంబరు 2010

16 పేజీలు

ఇంటర్నేట్ ద్వారా వాతావరణ ఆధారిత వ్యవసాయం

న్యూస్టుడే. వరంగల్ వ్యవసాయం: ప్రపంచంలోనే మొట్టమొదటిసారిగా వరంగల్ జిల్లాలోని బైరాన్ పల్లిలో ఇంటర్నేట్ ద్వారా వాతావరణ ఆధారిత వ్యవసాయ కార్యక్రమాన్ని చేపట్టినట్లు ఆస్ట్రేలియాకు చెందిన వ్యవసాయ శాస్త్రవేత్తలు రోగర్ స్టాన్, లిండి మెకోన్లు తెలిపారు. బుధవారం హాసన్ పర్తి మండలం బైరాన్ పల్లి గ్రామంలో ఆచార్య ఎస్వీరంగా వ్యవసాయ విశ్వవిద్యాలయం, ఆసియా ఫసిఫిక్ నెట్ వర్క్ ప్రాజెక్టుల ఆధ్వర్యంలో ఇంటర్నేట్ ద్వారా వాతావరణ ఆధారిత వ్యవసాయంపై ఆవగాహన సదస్సు జరిగింది. ఈ సదస్సులో ప్రొఫెసర్ రోగర్ స్టాన్, లిండి మెకోన్లు మాట్లాడుతూ బైరాన్ పల్లితోపాటు నల్గొండ, మహబూబ్ నగర్ జిల్లాలలో ఒక్కో గ్రామాన్ని ఎంపిక చేసినట్లు తెలిపారు. ఈ గ్రామాలలో ఇంటర్నేట్ ద్వారా వాతావరణ వ్యవసాయ సూచనలు రైతులకు అందిస్తున్నామని వారు తెలిపారు. వాతావరణ అధ్యయన కేంద్రం ప్రిన్సిపల్ లకు అందిస్తున్నామని వారు తెలిపారు. వాతావరణ అధ్యయన కేంద్రం సమాచారాన్ని సైంటిస్టు డాక్టర్ రాజారెడ్డి మాట్లాడుతూ వాతావరణానికి సంబంధించిన సమాచారాన్ని ప్రతీ వారంలో రెండుసార్లు మంగళ, శుక్ర వారాలలో బులిటెన్ రూపంలో అందిస్తున్నామని తెలిపారు. కార్యక్రమంలో వాతావరణ శాస్త్రవేత్తలు శ్రీనివాస్, ఎన్. సుధాకర్ రెడ్డి, కే.కే.సింగ్, విష్ణువర్ధన్ రెడ్డి, ఏరువాక కేంద్రం కోఆర్డినేటర్ డా. ఉమా రెడ్డి, మహేష్, వెంకటరాజు, తదితరులు పాల్గొన్నారు.

**Dr. M. R. REDDY
GROUP OF COLLEGES**

Parkal, Dist: Warangal.

**Management Seats
are Available**

M.Sc., Chemistry

9346467776, 9948149650

Dr. M.Raja Reddy

సాక్షి 24|7

వరంగల్

శుక్రవారం 12-11-2010

‘రైతులకు అవగాహన కల్పించాలి’

హన్మంపల్లి, న్యూస్ లైన్:

వాతావరణంలో వస్తున్న మార్పుల పట్ల రైతులకు ఎప్పటికప్పుడు అవగాహన కల్పించాలని ఆంధ్రప్రదేశ్ శాస్త్రవేత్త, ప్రొఫెసర్ రోగోర్ స్టోన్ సూచించారు. శాంతి సర్వీస్ సొసైటీ ఆధ్వర్యంలో ఎన్.జి. రంగా విశ్వవిద్యాలయం, అంతర్జాతీయ వ్యవసాయ పరిశోధనా కేంద్రం సహకారంతో హన్మంపల్లి మండలం బైరాన్ పల్లి గ్రామంలో ఇంటర్నేట్ ద్వారా వాతావరణ ఆధారిత వ్యవసాయంపై సదస్సు నిర్వహించారు. కార్యక్రమానికి రోగోర్ స్టోన్ ముఖ్యఅతిథిగా హాజరయ్యారు. ఈ సందర్భంగా ఆయన మాట్లాడుతూ పంటల్లో వస్తున్న చీడ పురుగుల నివారణకు ఇంటర్నేట్ ద్వారా ప్రతి 15 రోజులకోసారి వీడియో ప్రదర్శన నిర్వహించి రైతులకు అవగాహన కల్పిస్తామన్నారు. ప్రదర్శనల ద్వారా రైతులు ఎప్పటికప్పుడు అవగాహన పెంపొందించుకుని వాతావరణ పరిస్థితులలో వచ్చే మార్పులను గమనించి తక్షణ చర్యలు చేపట్టాలన్నారు. శిక్షణను రైతులు సద్వినియోగం చేసుకోవాలన్నారు. ఎన్.జి. రంగా వ్యవసాయ విశ్వవిద్యాలయ వాతావరణ అధ్యయన కేంద్రం ప్రిన్సిపాల్



పత్తి చేలును పరిశీలిస్తున్న రోగోర్ స్టోన్

డాక్టర్ రాజారెడ్డి మాట్లాడుతూ వాతావరణ మార్పులపై ప్రతి మంగళ, శుక్రవారాల్లో రైతులకు సమాచారం అందిస్తున్నామన్నారు. రైతులు ఇంటర్నేట్ ద్వారా వచ్చే వాతావరణ సూచనలు, బులిటిన్ ద్వారా వచ్చే వాతావరణ వ్యవసాయ సూచనలు పాటించి అధిక దిగుబడి సాధించాలని కోరారు. కార్యక్రమంలో వాతావరణ అధ్యయన కేంద్రం సీనియర్ సైంటిస్ట్ డాక్టర్ శ్రీనివాస్, శాంతి సర్వీస్ సొసైటీ కార్యదర్శి నరహరి సుధాకర్ రెడ్డి, సంస్థ కో-ఆర్డినేటర్ రమేష్, నరేందర్ రెడ్డి, ఆదర్శ రైతులు పాల్గొన్నారు.

ఇంటర్నెట్ ద్వారా పంటల అధ్యయనం

● ఆస్ట్రేలియా శాస్త్రవేత్త ప్రొఫెసర్ టోగోర్ స్టోన్

హనన్ పర్తి, మేజర్ న్యూస్ : వ్యవసాయ రంగంలో వస్తున్న వాతావరణ మార్పులను, వీడపీడల నివారణను రైతులకు ఇంటర్నెట్ లో వీడియో ప్రదర్శన ద్వారా రైతులకు అవగాహన కల్పిస్తామని ఆస్ట్రేలియా శాస్త్రవేత్త ప్రొఫెసర్ టోగోర్ స్టోన్ అన్నారు. మండలంలోని బైరాన్ పల్లిలో శాంతి సర్వీస్ సొసైటీ ఆధ్వర్యంలో ఆచార్య ఎన్ జి రంగా విశ్వవిద్యాలయం, అంతర్జాతీయ వ్యవసాయ పరిశోధనా కేంద్రం ఆస్ట్రేలియా సహకారంతో ఇంటర్నెట్ ద్వారా వాతావరణ ఆధారిత వ్యవసాయ సూచనలపై అవగాహన సదస్సు నిర్వహించారు. ముఖ్య అతిథిగా అంతర్జాతీయ వ్యవసాయ పరిశోధనా కేంద్రం యూనివర్సిటీ ఆఫ్ సదరన్ క్రిస్ట్ లాండ్ ఆస్ట్రేలియాకు చెందిన శాస్త్రవేత్త ప్రొఫెసర్ టోగోర్ స్టోన్ హాజరై మాట్లాడారు. రైతులకు ఎప్పటికప్పుడు వ్యవసాయ రంగంలో వస్తున్న మార్పులను అధ్యయనం చేసి రైతులతో చర్చించి పంటలలో వస్తున్న వీడపీడల నివారణను ఇంటర్నెట్ ద్వారా ప్రతి 15 రోజులకొకసారి వీడియో ప్రదర్శన ద్వారా అవ

గాహన కల్పిస్తామన్నారు. ఈ ప్రదర్శన ద్వారా రైతులు ఎప్పటికప్పుడు అవగాహన చేసుకొని పంటలలో వాతావరణ పరిస్థితులలో వచ్చే మార్పులను గమనించి తక్షణ చర్యలు చేపట్ట వచ్చన్నారు. ఈ అవకాశాన్ని రైతులందరు వినియోగించుకొని అధిక లాభాలు పొందాలన్నారు. ఆచార్య ఎన్ జి రంగా వ్యవసాయ విశ్వవిద్యాలయ వాతావరణ అధ్యయన కేంద్ర ప్రెసిపిటల్ సైంటిస్టు డాక్టర్ రాజారెడ్డి మాట్లాడుతూ వారంలో ప్రతి మంగళవారం, శుక్రవారం రాబోయే నాలుగు రోజుల్లో వాతావరణంలో వచ్చే మార్పులను బుల్లెటిన్ ద్వారా అందజేస్తామన్నారు. రైతులందరు ఇంటర్నెట్ ద్వారా వచ్చే వాతావరణ సూచనలను బుల్లెటిన్ లో తెలుసుకొని రైతులు అధిక దిగుబడులను పొందవచ్చన్నారు. ఈ కార్యక్రమంలో వాతావరణ అధ్యయన కేంద్రం సీనియర్ సైంటిస్టులు డాక్టర్ శ్రీనివాస్, శాంతి సర్వీస్ సొసైటీ కార్యదర్శి నరహరి, సుదాకర్ రెడ్డి, సంస్థ కో ఆర్డినేటర్లు రమేష్, నరెందర్ రెడ్డి, రైతులు పాల్గొన్నారు.



Glossary of Terms

Avatar - An animated digital “object” representing the embodiment of the user in a virtual environment, controlled by the user.

eLearning – Broad definition of the field of using technology to deliver learning and training programs.

Second Life - The interactive 3D virtual world created by Linden Labs in 2003, now host to millions of virtual residents.