

ALUMNI & FRIENDS

Spring 2006

"We Bring Engineering to Life"

Biological & Agricultural Engineering

In This Issue

Hydrology Study in South America 1

Faculty News 2

Department Head's Comments 3

Researchers in Uruguay ... 4

Dr. Parsons an Unexpected Passing 5

Professor Fore lived to 91 years of age 5

Alumni Updates 6

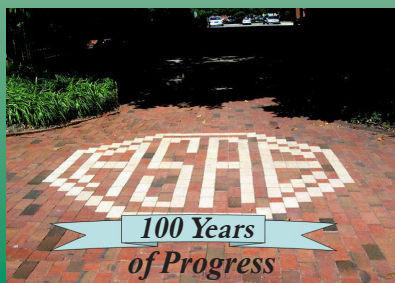
Outstanding Alumnus Award 7

Fall Graduation Listing ... 8

ASAE Approaching its Anniversary 8

ASAE is Approaching its 100 yr. Anniversary

In 2007 ASAE will be 100 years old. Learn what is being done to start the celebration. See: page 8.



Visit BAE on the web at:
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 Fax comments & questions to:
 BAE News 919-515-6772

Hydrology Study in South America...

In the fall of 1999 a long-term collaborative research and demonstration project began in Uruguay, S.A. It was sponsored by funds from the Weyerhaeuser Foundation and the INIA. The project was planned and lead by the NCSU Team of Dr. R. Wayne Skaggs, Dr. George (Chip) Chescheir, Dr. J. Wendell Gilliam of Soil Science, and Dr. D. M. Amatya from the U.S. Forest Service. Other cooperators in the project were Colonvade S.A., INIA scientists, and researchers from the Universidad de la Republica.

The project was initiated after Dr. Skaggs was invited by Weyerhaeuser Company and Colonvade, S.A. to travel to Uruguay to assess methods for determining the hydrologic effects of growing trees in Northern Uruguay. The visit led to a proposal by Skaggs to the Weyerhaeuser Company Foundation and to INIA (Uruguay government agency similar to our USDA) for funding to support a research project, "Effects of Afforestation on the Hydrologic Behavior of a Basin of the Tacuarembó River." The Tacuarembó River is located in Northern Uruguay, about 31° S. Latitude. A second proposal for continued support was approved by the Weyerhaeuser Company Foundation in 2003.



Uruguay is about the size of Washington state and sits at the lower tip of Brazil next to Argentina. Most of Uruguay's landscape is gently undulating grass/pasture lands with approximately 78% consisting of pasture for livestock, 15% for crops and 3.3% remains native forest. Some of the pastures have been



A view of one of the projects paired watersheds. The H-Flume with instrumentation records flow rates and samples for water quality.

degraded by bad agricultural practices, generally the over-grazing of cattle and sheep. Land use is dominated by ranching and farming, and employs most Uruguayans.

The deeply defined roots, history and cultural traditions of Uruguay's people is reflective of the fact that Uruguay is an agriculture-based economy with its agriculture exports generating most of its income.

continued on page 2

Faculty News

Dr. Gary Roberson was recognized by the Faculty Center for Teaching and Learning as the 2005 Faculty Award Winner for Outstanding Service in Support of Teaching and Learning. Roberson received a plaque and monetary award.

Roberson's technological innovations in the classroom and his general support of the BAE teaching programs are greatly appreciated. BAE has renovated and updated many BAE classrooms. The rooms are currently fitted with various types of multi-media technologies and other general classroom upgrades.

Faculty Members Receive Honors and Awards at the 2005 American Society of Agricultural Engineers

Dr. Robert Evans, P.E., became an ASAE Fellow-2005 Society of Agricultural Engineers (ASAE). Evans was accepted into an elite group of outstanding engineers within the Society of Agricultural Engineers.

continued on page 3



Department Head James Young
Writer/Graphics Carolyn Mitkowski
Advisor Mike Boyette

BAE Alumni & Friends is a semiannual publication of the Biological and Agricultural Engineering Department, North Carolina State University, Box 7625, Raleigh, NC 27695-7625.

If you would like to contribute to the next issue of BAE Alumni & Friends, please send your contributions to Dr. Young at address above or email: Jim_Young@ncsu.edu or Carolyn_Mitkowski@ncsu.edu.

Hydrology Study

continued from page 1

Its largest exports are rice, leather products, wool, fish, dairy and beef. Beef exports provide half the total export revenue of Uruguay. Forestry exports are nominal when compared to beef, therefore in the citizen's eye, the forestry industry has tenderfoot status.

Uruguay's forestry industry began with the Forestry Act of 1988. Because of several decades of tremulous social/economic conditions, Uruguay heavily borrowed from the World Bank. In the mid-1980s, debt reduction and free-market reform were sought. The government believed providing tax shelters and incentives to grow an existing fledgling forestry industry would help with improving their economy.

The government actively began promoting national assets which included its people (98 % literacy rate), the quantity and expanse of pasture/grazing land, its rich soils with the potential for high yields and rapid tree growth where some tree species grow 2 to 3 times faster than normal. Investors noticed this potential and it spurred land purchases by local entities, South American and foreign companies. Since then, forestry owners have converted some of their land holdings to fast growing eucalyptus and pine plantations. These trees grow easily and provide soft and hardwood for export.

Due to noticeable increases in land conversions to plantations, the forestry industry has become more visible to local ranchers and farmers. This is spurring questions and public concern as to how plantations will affect water use and water quality, since the public and industries are to share mutual resources over the long-term.

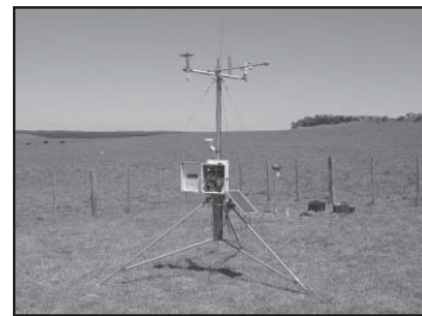
The NCSU Hydrology study was planned to determine the real hydrologic impacts of changing land use from a grassland (pasture) area to pine plantation. Studies of this type have been done before with many outcomes already known. However, no research study has addressed effects of such land use changes under Uruguay's climate and soils conditions.

The World Bank Forestry Policy requires all commercial harvesting of any forest (including plantations) to seek sustainability management certification. The requirement promotes compliance to established environmental standards and protects other standards also. All Colonvade S.A. and Weyerhaeuser tree plantations are certified and managed to ISO 14001 sustainable standards.

Today, the market is seeing green purchasing become more commonplace at all levels of purchasing by consumers, suppliers, and manufacturers. Europeans, by far, are the most demanding of sustainable products, as their options for waste disposal become more limited. Governments are also adding compliances through legislation and policies like the "Polluter Pays Principle" which enhance and support country specific sustainability goals and efforts.

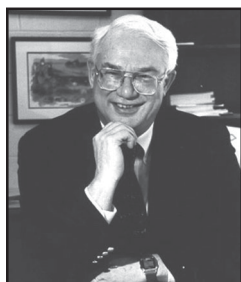
The web portal EarthTrends.com notes: "Progressive businesses are embracing eco-efficiency and product stewardship to distinguish themselves from their competitors and to recognize cost savings."

continued on Page 4



View of the weather station installed between the two watersheds.

Department Head's Comments



James H. Young

This is the eleventh issue of Alumni & Friends Newsletter for which I have written department head comments. It will most likely be the last as I plan to retire this fall (after forty years) as soon as a new department head is identified. As my career in this department comes to a close, I would like to thank all of you for the support that you have given to me personally and to the BAE department through the years. We have a great family of supporters consisting of alumni, past and present faculty and staff, students, and various cooperators throughout the state and nation. I sincerely appreciate your support through the years and look forward to our continued friendship in years to come.

The BAE department produced its first graduate in 1935 and since then a great number of students have completed their programs in the department. In 2005, the BAE department (along with the College of Agriculture and Life Sciences, CALS) initiated an Outstanding Alumnus Award to recognize some of our alumni for their service to their community, industry, and/or NC State University and the college of Agriculture and Life Sciences. I am very pleased to announce that Professor George B. Blum, Jr. was selected as the first recipient of our departmental Outstanding Alumnus Award (see article on page 7).

I wish to solicit your nominations for the 2006 Outstanding Alumnus Award (see details elsewhere on this page). While the faculty and staff of the department are aware of many outstanding achievements by our alumni, we are certainly unaware of the contributions of many. Please take time to make nominations for this year's award by May 15, 2006.

I would also wish to direct your attention to the announcements of the deaths of three former faculty members. Professor Emeritus Julian Fore passed away in March of 2005 at the age of 91 (see page 5), Dr. John Parsons died unexpectedly on October 3, 2005 (see page 5), and most recently Dr. Frank J. Humenik died on March 28, 2006 as this newsletter was about to go to print. We greatly appreciate the contributions these individuals made to the teaching, research, and extension programs of the department.

Dr. Humenik joined BAE in 1969 with a research and teaching appointment in the area of animal waste management. In 1974 he became the departmental extension leader, a position which he held until 1998. He also served as Interim Department Head during the mid 1980's. In 1998 he accepted the position of Coordinator of the College of Agriculture and Life Sciences Animal Waste Management Programs (AWM). He has been recognized internationally for his work in animal waste management and has been honored by ASABE with the G.B. Gunlogson Countryside Engineering Award and as a FELLOW of the Society. Frank served as Director of the National Center for Animal Waste Management. We will greatly miss his leadership with respect to animal waste management and will miss his wit and "sheepish" grin. ■

Faculty News

continued from page 2

Dr. James Young, P. E., and an ASAE Fellow, is the recipient of the 2005 Massey-Ferguson Educational Award in recognition of his outstanding dedication and contributions to research, teaching, advising, mentoring, and leadership in academic programming.

Dr. Philip Westerman is the recipient of the 2005 The Gunlogson Countryside Engineering Award for his outstanding contributions to the agricultural community through the development of live-stock waste management and treatment systems. His work has resulted in improved management and utilization of animal manure and the reduction of negative environmental impacts both in North Carolina and nationally.

Dr. David Beasley, P.E., was presented with a ASAE President's Citation. The inscription reads "For his distinguished service to ASAE and outstanding leadership in the implementation of an ABET Biological Engineering Program Criteria with ASAE as the lead Society." ■

Request for Nominations for 2006 Outstanding Alumnus Award. Please submit a nomination letter to the Department Head, Dr. Jim Young, by May 15, 2006. The recipient must have received a degree from the BAE department. Nominees should have a record of service to their community, industry, and/or to NC State and the College of Agriculture and Life Sciences. The nomination letter should explain why the nominee deserves the award. The award recipient will be recognized in Fall of 2006.

Researchers in Uruguay

Over the last 7 years of the project, members of the NCSU research team have traveled to Uruguay many times. After Dr. Skaggs identified the field research sites in 1999, Dr. Devendra Amatya conducted a hydrologic analysis of the site and designed the H-Flumes used to measure flow rates from the watersheds. In early 2000 he traveled to the project to verify details of flume construction. In subsequent trips, Amatya returned to collect data and present results to cooperators. Dr. Wendell Gilliam went there several times to work with local scientists developing strategies to study effects on water quality and soil properties.

As project manager of the site, Dr. Chescheir had a particularly important role. After H-flumes were completed in 2000, Chescheir traveled to supervise the installation of monitoring equipment. He set up a schedule for data collection and transfer to BAE, and also for equipment maintenance and updating that would be implemented over the stretch of the project. Due to the distance of the site, potential project problems need to be anticipated and solutions planned prior to annual trips that Chescheir makes.

In the beginning, Chescheir's trips were more frequent because forestry technicians needed instruction pertaining to project specific sampling and data collection methods, and additional reviews of equipment maintenance and trouble shooting strategies.

Chescheir said, "No project ever runs without a few glitches. We did have some instrumentation malfunctions at first, they were mostly due to a season of unusual wet weather..."

continued on page 5

Hydrology Study

continued from page 2



(Above) The rows of pine plantings in 2003.
(Below) Dr. Chescheir beside the trees after 27 months of growth 2005.

Wood certified to standards are favored worldwide by manufacturers who see cost savings over the full-cycle of product-to-consumer use and disposal. Today, and even more so tomorrow, sustainable raw goods production and environmental product performance should increase widely. There is mutual agreement by industry and governments that good sustainability practices are valuable.

Colonvade SA has been a willing and enthusiastic partner in this research. The research is being conducted on their La Corona Ranch about 50 km north of the city of Tacuarembó in Northern Uruguay.

It was agreed at the beginning that the NCSU team would develop and plan the hydrology study and work cooperatively with Colonvade's scientists, engineers and technicians to establish and maintain the research site

and collect the data. The data are sent electronically to N.C. State for analysis and the results are presented annually in Uruguay by the research team. The team is also working cooperatively with researchers at Universidad de la Republica in Uruguay on soil and water quality issues and with Uruguay's forest industry and government agencies to implement the findings of the project.

The experiences of NCSU researchers in Uruguay are in the left panel.

Currently, the NCSU team is presenting its findings to the forestry industry, Uruguayan citizens, environmental groups, land owners, ranchers, and the Uruguayan government. A general pamphlet summarizes the study for the public. It is believed the study will educate all entities as to the real environmental impacts of pine plantation hydrology in this particular region.

Continuing below are the NCSU team's research findings.

The team decided the best way to measure the long-term impact of the changes in the land within the Tacuarembó River basin was to use a paired watershed approach. Two adjoining watersheds, 69 and 108 ha in land area were used. H-flumes, together with instruments to continuously record outflow rates and to collect samples for water quality, were installed at the outlet of each watershed. Meteorological data including rainfall, temperature, net and solar radiation, relative humidity and wind speed were measured and recorded by a weather station (photo page 2) situated on the boundary separating the two watersheds. An additional recording rain gauge and 3 manual gauges have been distributed over the two watersheds.

continued on page 6

Dr. Parsons an Unexpected Passing

Dr. John E. Parsons died unexpectedly Oct. 3, 2005. It's always difficult to find words when a life is shortened for someone who had so much more to give. It can, however, be said that in 20 years of teaching he introduced a great many BAE students to essential computational engineering methods. In one of his introductory courses, Parsons taught students to develop solution algorithms and execute them in spreadsheets, equation solvers, and programming. His course on surface water quality modeling taught basic hydrology, and erosion/chemical transport using modeling. He loved mathematics and he loved solving and presenting a good problem.



Professor John E. Parsons with student

As BAE's computer guru, Parsons oversaw the department's computing environment. He helped many people to understand the capabilities of computers. Recently, he teamed with faculty to establish BAE's first web-based graduate certificate offering. Some courses are still being converted from web-based to taught entirely on-line. At the time, Parsons was pulling together the technical resources for all the course conversions. He had completed a new course "Introduction to TMDL" (a hot topic). Sadly, he had only taught the new graduate course on-line for one semester.

Dr. Parsons enjoyed his research involving modeling programs and was erudite in the use of: CREAMS, GLEAMS, DRAINMOD, DM-CREAMS, WATRCOM, and in Vifsmod (Vegetative Filter Strip Modeling System) which he developed (www3.bae.ncsu.edu/vfsmod/). He was a member of the ASAE Soil and Water Hydrology Group and one of its past chair persons.

Parsons is survived by his parents, several cousins and an entire NCSU department. A poster was put together to celebrate Parsons life in pictures. It was presented to his family at a BAE gathering held for all. The poster can be viewed on the web at: www.bae.ncsu.edu/people/faculty/jparsons ■

Professor Fore lived to 91 years of age...

Professor Julian M. Fore passed away in March 2005. He was 91 years old, having lived a very long life and leaving a very long legacy. Fore is best remembered for ensuring that the technological aspects of a BAE education were maintained and coordinated. Fore came to BAE in 1956 bringing with him an impressive background working for the Tennessee Valley Authority, Michigan State University, and two commercial companies. He received his M.S.A.E. from Purdue University.

One of the programs Fore supported with uncanny insight was the education of North Carolinians who were eager to learn but for various

continued on page 8

Researchers

continued from page 4

but, with the technician preparation plus my 24 hour US-to-Uruguay hotline, the data stayed flowing..."

Overall, Chescheir said "The technicians are bright and dedicated. They learned quickly and gained many new skills. We learned to solve transcontinental connectivity problems and communication issues, also to modify designs for quickly changing hydrologic conditions. We found that explanations for instrument modifications need to be clearly understandable."

Of the experience Chescheir said that, "aside from project work, everyone has truly enjoyed the camaraderie, good will, and sharing that developed in five years." The Uruguayan people couldn't have been more helpful and welcoming. Chescheir says, "We are pleased to see the industry grow and improve along with the well being of the people." Dr. Skaggs who travels annually to review the research and confer with cooperators and government agencies agrees with these comments.

Finally, Chescheir mused, "If you ever go to Uruguay, be prepared to be offered all the meat you could possibly want. We jokingly call it a "vegetable free zone." The meat is always tasty either by itself or in the hearty stews that warm us after working in the field on a chilly winter day. Winter by the way is in July so plan for it."

Dr. Skaggs said of Chescheir's work in Uruguay, "He successfully juggles our field projects in Uruguay and here in North Carolina — projects on two continents. I'd say that makes him a project management expert." ■

Alumni Updates

Hello from **Dermott Cooke**, and congratulations Wolfpack on a pretty good basketball season.

It's been quite a while since my days at NC State and life's taken me on a tour of the US being in DC for several years, Ohio briefly, and now New York. We've just had our fourth child (a girl) and I'm in the midst of a satisfying and challenging career as a Patent Attorney with the firm of Scully, Scott, Murphy & Presser in Garden City, NY. My work involves mostly medical devices, which I really enjoy. The breadth of my Biological Engineering background has served me well.

Because of the medical device work I do, I was going to drop a line to Dr. Blanchard, but just learned that she's left NC State. I would also like to tell Drs. Boyette, Hale, Willits and others including retired Dr. Rohrbach that I said hello.

On a Sad Note...

Stanley M. Leary, died at 77 last March. Leary was born in Camden County, NC. He attended NC State and graduated in 1963 from the department. Then for 25 years he worked as a BAE Research Engineer working mostly on tobacco curing projects. He is remembered for his quality work by many of the folks here.

Clarence Harold "Pat" Blue has passed away this year. He was 77 years old and living in Southern Pines, NC. His son, Thomas Blue of BLUE: Land, Water, Infrastructure of Southern Pines, NC, wished to inform all those at BAE who

continued on page 7

Hydrology Study

continued from page 4

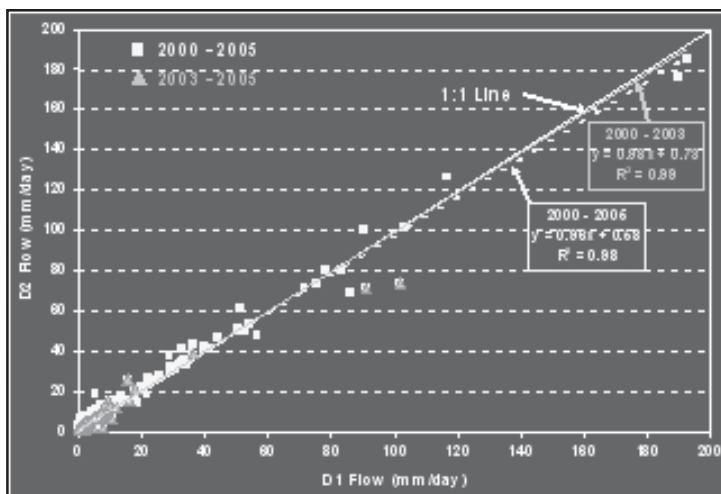
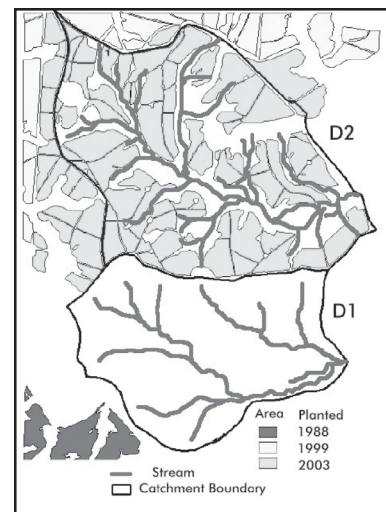
The data collection in the Uruguay project began after installation was completed in June, 2000. Both watersheds were maintained in grassland for the first three years for calibration purposes. The 108 ha watershed D2 was planted in July, 2003 with loblolly pine (right, D2 and D1 layouts). The 69 ha watershed (D1) remains as pasture throughout the study. Measurements will continue to be taken until the pine reaches its maturity documenting the differences in hydrology at the different stages of the production cycle.

Working with Drs. Skaggs and Chescheir, Nicholas von Stackelberg, an M.S. student in Biological and Agricultural Engineering, was challenged to predict hydrologic impacts of changing land use from pasture to mature pine. He spent June and July 2004 on the site in Uruguay collecting field data and information for his thesis research.

Nick used the SWAT model to conduct multi-year hydrology simulations under the two land uses. His thesis was published in 2005 and can be accessed on the web at: (www.lib.ncsu.edu/theses/available/etd-05172005-153759/).

Results are preliminary at this stage. Several years will be required for the pine to mature. The impacts would logically be expected to increase with age of the trees. Determination of impacts on a short-term basis could be further confounded by variability of weather from year-to-year.

Measurements during the first three years (July, 2000 to June, 2003) resulted in an excellent data set for comparing hydraulic responses of the two watersheds under the same grassland cover. These results showed that outflow characteristics of the two watersheds are somewhat different with watershed D2 having substantially more base flow than watershed D1. Fortunately, the relationship between outflows from the two watersheds is very well defined. Changes in the



continued on page 7

Hydrology Study

continued from page 6

volume of runoff resulting from afforestation would change the slope relationship (see diagram).

It is anticipated, based on studies in other countries around the world, that afforestation will increase evapotranspiration (ET) and result in a decrease in runoff or outflow. In this study, the effect would be to reduce the slope of the relationship. If, for example, ET of a mature forested watershed is increased, so outflow is reduced by 25%, the slope of the forested versus pasture relationship in the chart would be decreased from nearly 1.0 to about 0.75. It should then be possible to assess the impact of afforestation on outflow volume on a seasonal and annual basis, as well as a number of other important hydrologic issues, by the collection of long-term, high quality outflow data on these watersheds.

Von Stackelberg was able to describe the difference in base flow between the two watersheds with the use of two different hypotheses. The first hypothesis was established on presumption that the ET of the D2 watershed pine found on the higher elevations and in shallow soils would be limited in ET and result in excess water that would increase the base flow when it was compared to the D1 pasture watershed. The second hypothesis assumes subsurface interflow from outside the boundaries of the pine watershed D2. Both hypotheses made it possible for the SWAT model to predict the watersheds hydrology.

The current results indicated that a mature pine forest would have an average of about 25% less outflow than continuous pasture. The results are subject to a number of assumptions, each of which is subject to error. The continued research to be conducted on this site will increase the accuracy and reduce the uncertainty of these projections. ■

2005 Outstanding Alumnus Award

2005 Outstanding Alumnus Award Recipient for the Biological and Agricultural Engineering Department was Professor Emeritus George B. Blum, Jr. (B.S. - 1949; MAE - 1956). Professor Blum is undeniably the most outstanding teacher and adviser in the history of the department, having won numerous teaching and advising awards, including the ASAE Massey-Ferguson Educational Award in 1992.



George B. Blum, Jr.

Blum worked in the BAE department for 41.5 years, retiring in 1991, with over 25 years as the undergraduate teaching coordinator. His enormous influence on the almost 2,000 students that he advised was evident in the remarks by faculty and former students at the BAE reception held for Professor Blum on Oct. 28, 2005. He was again recognized that day at a CALS reception held for the outstanding alumnus recipients from each CALS department. Blum received a plaque from CALS and one from BAE. In the halls of Weaver Labs, the department has also placed his photo declaring his outstanding efforts.

BAE is looking forward to awarding another alumnus next year. Please help us with your nomination and see Dr. Young's comments on page 3. ■

Learn more....

USDA

www.srs.fs.usda.gov/econ/lab/
www.srs.fs.usda.gov/soils/soilhome.htm

Forest Nutrition Cooperative

www.forestnutrition.org/index.htm

Earth Trends

www.earthtrends.wri.org/

World Bank

www.worldbank.org/

Magazine of the Intra American Bank

www.iadb.org/idbamerica/index.cfm?thisid=3337

IFI International Forestry Investment

www.ififorestry.com/uruguay.html

Weyerhaeuser

www.weyerhaeuser.com/or
www.weyerhaeuser.com/ourbusinesses/forestry/timberlands/

American Forest & Paper Assoc.

<http://www.afandpa.org/>

United Nations Food & Agriculture Org.

www.fao.org/trade/index_en.asp

World Bank-Forests Policy

www.worldbank.org/-then search forestry

Sustainable Forestry Initiative (SFI)

www.aboutsfi.org

American Tree Farm Systems

www.treefarmssystem.org

Alumni Updates

continued from page 6

knew his father or his company.

Blue graduated from BAE in 1950 and went on to found CH Blue & Associates Land Surveying in Southern Pines. In addition to his business, Blue's professional career included an appointment by then Gov. Robert Scott to the NC Board of Examiners for Engineers and Land Surveyors, a past position as president of the NC Society of Surveyors; and he served as Moore County's Surveyor. ■

Keep in touch: Write or e-mail Dr. Young. The address is found on page 2 in the BAE masthead.

Fall 2004 Grads

Name	Curriculum
Brisson, David	BE, BME
Ellis, Jaelyn	BE
Evans, Rachel	BE
Fulton, Jason	BE
Hale, Paul	AET
Kim, Jaini	BE
Ruffin, Prince	AET
Von Stackelberg, Nicholas	MS
Tanjore, Deepti	MS
Zickefoose, Aaron	MBAE

Graduating students and alumni have the opportunity to purchase a brick in the CALS walkway. To learn more see: www.cals.ncsu.edu/index.cfm?showpage=242

View more graduation pictures at: www.bae.ncsu.edu/news/



ASAE

continued from page 1

As the ASAE (now ASABE) prepares for a new century, it will celebrate its past achievements and welcome in the future. The ASAE has changed its name to ASABE (American Society of Agricultural and Biological Engineers). The change reflects the increasing interdisciplinary aspects of the work that Agricultural and Biological engineers do today. The society has changed both its web site and logo. Check it out! www.asabe.org

American Society of
Agricultural and Biological
Engineers



BAE has displayed a poster in Weaver Labs celebrating the shared journey by both BAE and ASAE over years of mutual history. The history goes from mostly mechanized Agriculture solutions to today's increasingly bio-based ones. ■

Professor Fore

continued from page 5

reasons could not consider a four year program. Fore's reasoned that a variety of educational opportunities needed to be provided to adequately serve society. This was the start of a two year program which was initiated in 1960.

The two year program was geared to those who wished to be quickly employed in the agricultural industrial field. These programs were organized under the Agricultural Institute of the School of Agriculture and Life Sciences.

The quality of the education and training offered came from having the regular four year faculty teach the courses. The first graduates received the diploma of "Associate in Applied Agriculture." Today this tradition is still practiced by the department. ■

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