

Transport and the Environment

PUBP 710 (TP1 and 001)

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Faculty:

Professor Kenneth Button

(Office hours: Tuesday 3.30— 4.30 pm at Arlington and by appointment at Fairfax Campus Office. telephone 703-993-4647, e-mail kbutton@gmu.edu)

Danilo Pelletiere

(Office hours: Tuesday 3.30— 4.30 pm at Arlington Campus and by appointment, telephone 703-993-3564, e-mail dpelleti@gmu.edu)

Place

Arlington Campus, Tuesday 7.05-9.35 pm, Room 303 and live TV broadcast to off-campus TPOL students taking 710.

Brief Outline of Course

The aim of this course, which is multi-disciplinary in its orientation, is to examine the implications of transportation and to look at ways in which public policy has attempted to handle them and at ways in which policy may move in the future. It looks at all modes of transportation and at most of the environmental ramifications. In addition to the two faculty, there will be several guest speakers who will provide wider perspectives on particular issues.

Recommended Reading .

There is no single text for this course. For each class there will be assigned reading that will be made available electronically or placed on electronic reserve in the library. There are a number of sources that will be helpful in terms of providing a wider appreciation of some of the issues considered in this course. In particular, there is the journal ***Transportation Research D: Transport and Environment*** that contains a significant amount of relevant material and can be accessed electronically in the GMU library as part of “ Science Direct” .

Course Topics

Week 1 What do we mean by the Environment? (January 22, 2002) KB/DP

The aim of this class is to introduce students to some of the key environmental concerns associated with modern transportation. Two weeks prior to the start of the course a questionnaire will be sent to students. The summary results of the responses will form part of the basis for the class.

Reading: K.J. Button and P. Rietveld, 'Transport and the environment', in J.C.M. van den Bergh, ***Handbook of Environmental and Resource Economics***.

Week 2 Air Pollution and Remediation Options* (January 29, 2002) KB

While many forms of activity generate air pollution, transportation poses particular problems both because of the diversity of the pollutant generated and the level high level of emissions of some pollutants. This class will look at the causes of these problems, the success of measures to alleviate them to date, and the other policy and technical options that may be used in the future.

Reading: D.M. Levinson and D. Gillen, *Transportation Research D* vol. 3 pp.207-224, 1998
X. Olsthoorn, *Journal of Air Transport Management* vol. 7, pp. 87-95, 2001
B. Johansson, *Transportation Research D* vol. 1 pp. 47-62, 1996
P.O. Plaut , *Transportation Research D* vol. 3 pp. 193-207, 1998

Week 3 Issues of Noise Annoyance (February 5, 2002) KB

Most surveys of individuals reveal that they consider traffic noise (including rail and air traffic) to be one, if not the main, adverse environmental effects of transportation. Noise is also a major issue in the construction and maintenance of transportation infrastructure. Besides the nuisance effects, excessive exposure to noise can have serious health implications. Traffic noise effects are practically difficult to measure and evaluate but this will form one element of the class. Various methods, both technical and behavioral, for reducing noise nuisance will be assessed.

Reading: G. Nero and J.A. Black, *Transportation Research D* vol. 6 pp.433-461, 2000
E.I. Feitelson, R.E. Hurd and R.R. Mudge, *Transportation Research D* vol. 1 pp.1-14, 1996
M. Ignaccolo, *Journal of Air Transport Management* vol. 6, pp. 191-200, 2000
K. Johnson and K.J. Button *Transportation Research D* vol. 2 pp. 223-233, 1997
K. Stoilova nd T. Stoilov, *Transportation Research D* vol. 3 pp. 399-419, 1998

Week 4 Transportation, the Environment and Land-use* (February 12, 2002) DP

The natural environment is central to social wellbeing but also important is the built environment. The ways in which land use is divided between transportation and the types of transportation and related infrastructure that is provided affect the rural and urban architecture. Additionally, there are important links between the way in which land is used and the natural environmental consequences of transportation. There are debates, for example, about whether compact cities, and their concomitant transportation systems, are more environmentally benign than spatially dispersed land-use patterns. Different zoning patterns influence the modes of transportation used, the length and frequency of trips, etc.

Reading: L.D. Frank, B. Stone and W. Bachman, *Transportation Research D* vol. 5 pp.173-196, 2000
G. Rose and E. Ampt *Transportation Research D* vol. 6 pp. 95-111, 2001

H. Meurs and R. Haaijer, *Transportation Research D* vol. 6 pp. 429-446, 2001

Week 5 Environmental Movement, Ecological Thinking, and Sustainable Development* (February 19, 2002) KB/DP

A combination of greater scientific knowledge, higher incomes, and changing social priorities has led to changes in the way that the natural environment is now perceived. This trend extends well beyond transportation but because of the diversity of the environmental intrusions associated with transportation and the close physical proximity of transportation facilities to residential areas, it is a sector that has attracted particular public attention. This class looks at the driving forces behind these social trends, explores what is understood by sustainable development and where transportation fits within this type of framework, and discusses some of the much broader, ecological approaches to looking at environmental effects.

Reading: A. Root and L. Schintler., *Transportation Research D* vol. 4 pp.353-355, 1999.

J-P Rodrigue, B. Slack and C. Comtois 'Green logistics' in A.M. Brewer, K.J. Button and D. Hensher (eds) *Handbook of Logistics and Supply-chain Management*

T.F. Golob and D. Hensher, *Transportation Research D* vol. 3 pp. 1-19, 1998

Week 6 The Economic Costs of Environmental Damage (February 26, 2002) KB

There are economic costs, both long and short term, associated with excessive environmental degradation. It can impose health costs on individuals, it can reduce their economic productivity, it can adversely affect industries such as fishing and agriculture, etc. It is important, therefore, to be able to place some economic parameters around the costs of transportation associated environmental effects to allow economic assessments to be made about optimal levels of environmental damage. This class looks at a variety of possible ways of doing this and discusses their respective pros and cons.

Reading: R.Daniels and V. Adamowicz "Environmental valuation", in D. Henscher and K.J. Button, *Handbook of Transport Modelling*

Y. Schipper, R. Rietveld and P. Nijkamp, *Journal of Air Transport Management* vol. 7, pp. 169-180, 2001

D.M. Levinson, *Transportation Research D* vol. 3 pp. 207-225, 1998

Week 7 The Role of Governmental and Non-government Agencies* (March 5, 2002) DP

Government agencies at the local, state, national and international levels have responsibilities over the environmental effects of transportation. This class looks at the de facto roles that are taken by the various levels of government and their associated agencies. It looks at the rationale of the existing system, its strengths and its limitations. In particular, there is a focus on the possibility of overlapping responsibilities, unclear objections, inadequate resources, gaps in the system, and operational efficiency. The

focus will be on the US situation but there will also be some limited consideration of wider geographical matters (e.g., the role of the ICAO in developing policy on international aviation and environmental damage).

SPRING BREAK (March 12, 2002)

MID-TERM EXAMINATION (March 19, 2002)

Week 8 Policy Options* (March 26, 2002) KB

Transportation is responsible for a wide variety of adverse environmental effects and there is a corresponding portfolio of policy options for tackling these. Some of these policies aim at particular modes of transportation while others are generic across all modes. Some options deal with technology change, others relate to changing human behavior. Some can be applied at the local level while others may require national or international implementation. This class looks at some of the pros and cons of the policy options and considers why in practice some have been favored above others.

Reading: H. Jansen and C. Denis, *Transportation Research D* vol. 4 pp.379-396, 1999
S. Potter and M. Enoch *Transportation Research D* vol. 2 pp. 271-282, 1997
E. Quinet and D. Sperling “ Environmental protection” . in K.J. Button and D. Henscher (eds), *Handbook of Transport Systems and Traffic Control*
R. Brindle, ‘Traffic calming’ in K.J. Button and D.A. Hensher (Eds),*Handbook of Transport Systems and Traffic Control*
P. Rietveld, ‘Biking and walking: the position of non-motorized transport modes in transport systems, in *Handbook of Transport Systems and Traffic Control*
I. Solomon ‘Can telecommunications help solve transportation problems?’ , in D.A. Hensher and K.J. Button (eds) *Handbook of Transport Modelling*
D. K. Henderson and P.L. Mokharian, *Transportation Research D* vol. 1 pp. 29-46, 1996
S. Chiquetto, *Transportation Research D* vol. 2 pp. 133-147, 1997
B. van Wee, H.C. Moll and J. Dirks, *Transportation Research D* vol. 5 pp. 137-144, 2000

Week 9 Evaluation Techniques* (April 2, 2002) KB

Transportation conveys tremendous social and economic benefits. But there is a need for these to be set against its costs, including its environmental impacts. Additionally, these environmental impacts are diverse and often involve inter-linkages and trade-offs. This class examines some techniques that are available to compare the positive social/economic aspects of transportation with the environmental consequences and also to help decision-makers make trade-offs between these environmental effects when they are mutually exclusive. It looks at what is theoretically desirable and what is actually done in practice. Techniques developed by agencies such as the EPA and the DOT are explained. For comparative purposes, there is also some consideration of some of the procedures used in other countries such as the UK and Japan.

Reading: K.G. Willis, G.D. Garrod and D.R. Harvey, *Transportation Research D* vol. 3 pp.141-157 1998

Week 10 Public Participation Process* (April 9, 2002) DP

It is often the general public that is directly and indirectly affected by the adverse environmental effects of transportation. This class looks at ways in which the public can, to adopt an economic term, have their 'voice' heard in the decision-making process. The class will look at both the formal and informal ways in which this can be done. It will look at the institutional frameworks that are available, considering both their advantages and their limitations. Additionally, the 'public' is made up of many different groups (indeed any individual may belong to several at the same time) and there is a need to reconcile the often divergent views that exist concerning transportation provision and use.

Reading: E. Boyes and M. Stanissstreet, *Transportation Research D* vol. 3 pp.105-116, 1998
J. Gould and T.F. Golob, *Transportation Research D* vol. 3 pp. 157-170, 1998

Week 11 The Global Environmental Debate (April 16, 2002) KB/DP

Some thirty years ago there was scientific concern about the potential cooling of the Earth due to a forthcoming Ice Age. More careful analysis has now moved on to the consideration of the potential implications of global warming. In fact, this is one of several global environmental issues that are now at the forefront of much debate and others considerations include such things as high-level ozone depletion and the reduction in bio-diversity. This class looks at these much larger environmental concerns and the contribution of transportation to their growth and to their possible solution.

Reading: T.R. Lakshmanan and X. Han, *Transportation Research D* vol. 2 pp. 1-16, 1997

Week 12 Transportation and Environment Issues in the Greater Washington Area (April 23, 2002) KB/DP

The aim of this final class will be to pull together the ideas, concepts, and information gleaned from the core of the course and to use this to look at some of the major environmental problems that traffic poses in the Greater Washington Area. For this, there will be a need to be familiar with the transportation system of the region as well as the more generic material on environmental matters that is contained in the other elements of the course.

Week 13 Transportation, the Environment and Development in Developing Nations* (April 30, 2002) KB

The majority of the world's population lives in the poorer countries of the world. Their transportation and environmental problems differ considerably from those of the US and they, by definition, have fewer economic resources available to tackle these problems.

This class looks at some of these issues, their magnitude, and the efforts being made by local and inter-governmental agencies to alleviate them.

Reading: R.I.R. Abeyratne, *Journal of Air Transport Management* vol. 5, pp. 31-39, 1999
M. Yang, *Transportation Research D* vol. 3 pp. 297-308, 1998

READING WEEK (May 7, 2002)

FINAL EXAMINATION (May 14, 2002)

*It is anticipated that an outside speaker will contribute to part of these elements.

Assessment: Assessment will involve a mid-term and final examination that in total will contribute 70% towards the grade. In addition there will be periodic assignments that will contribute 30% towards the grade. The majority of the periodic assessment grading will come in week 12 when students will have to report back on work they will be assigned regarding local environment and transportation issues in the Washington area.