# 8th International Conference on Fate and Effects of Pulp and Paper Mill Effluents and 10th IWA Symposium on Forest Industry Wastewater 2012

Concepcion, Chile 8-11 January 2012

ISBN: 978-1-5108-2335-8

### Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2012) by University of Concepción All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact University of Concepción at the address below.

University of Concepción c/o Dr. Ricardo Barra Environmental Sciences Center, University of Concepción Barrio Universitario S/N, P.O. Box 160-C Concepción, Chile

Phone: +56 +41-220-4013

ricbarra@udec.cl

### Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400

Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com







# FORESTWATER PROGRAM ORAL PRESENTATIONS

	SUNDAY, JANUARY 8
09:00 - 14:00	Short course, `Cubo 4´ building: Microscopy and molecular biology tools for diagnosing biotreatment problem Instructors: M.Paice and J. Liu Using small fish for enviromental monitoring Instructors: K. Munkittrick and M. McMaster
16:00 - 18:00	Registration, `Cubo 4´ Building
18:00 - 19:00	Welcome reception
19:00 - 20:00	Chilean wine
	MONDAY, JANUARY 9
08:30 - 10:30	Registration, `Cubo 4´ Building
08:30 - 09:15	Open Sessions Plenary IWA. Grant Allen, Department of Chemical Engineering and Applied Chemistry University of Toronto, Canada. Where are the opportunities for our environmental technologies as the forest processing industry moves towards a biorefinery.
09:15 - 10:00	Plenary Fate and Effects. Mark E. McMaster, Aquatic Ecosystem Protection Research Division Environment, Canada. Investigating the causes of mill effluent effects on fish reproduction 4 in Canada: lessons learned.
10:00 - 10:30	Coffee break
10:00 - 17:30	Posters display

	Sessions Fate and Effects Ecotoxicology of effluents and the receiving enviroment	Sessions IWA Life Cycle Assessment and ecological footprints (water and carbon footprint)
10:30 - 11:00	1) B. Karrasch, H. Cid, S. Woelfl, R. Urrutia, C. Valdovinos, R. Barra, O. Parra. (Germany/Chile). Ecotoxicological impacts of pulp and paper mill effluents on carrying and assimilative capacities of plankton systems in Chilean rivers using a quantitative community to ecosystem level approach. 79	1) P. Wiegand, C. Flinders, G. Ice, D.Sleep, B. Malmberg, I. Lama, J. Schwartz, M. Mensink, D. Phenicie, W. Larson (USA). What do water profiles, water footprints, and water stewardship assessments reveal about the environmental 11 sustainability of the forest products industry?.
11:00 - 11:30	2) T. Heid-Furley, J. Lombardi (Brazil). Main pulp and paper mill toxic internal effluents, its impact on WWTP and treated effluent quality. 80	2) Å. Sivard, M. Malmaeus, M. Almemark, M. Karlsson, T. Ericsson, O. Simon (Sweden). Effects of further effluent treatment stages at pulp and paper industries.
		Session IWA Status of environmental issues nationally and regionally
11:30 - 12:00	3) C. Milestone, R. Orrego, P. Scott, A.Waye, M. Kohli, B. I O'Connor, B. Smith, H. Engelhardt, D. MacLatchy, V. Trudeau, T. Kovacs, T. Heid-Furley, A. Slade, M. Servos, D. Holdway, M. Hewitt (Canada). A comparison of effluents and wood feedstocks from pulp and paper mills in Brazil, Canada and New Zealand and their ability to affect fish reproduction: Part I - chemical profiling and in vitro assessments.	1) D. McLaughlin (USA). An update on the development of numeric nutrient criteria in the United States: a forest  13 industry perspective.
12:00 - 12:30	4) A. Llanos-Rivera, L. Castro, P. Vasquez, J. Silva, E. Bay-Schmith (Chile). Evaluation of kraft wood pulp mill secondary effluent toxicity in <i>Engraulis ringens</i> and <i>Strangomera bentincki</i> embryos utilizing a 82 developmental toxicity test.	2) S. Videla, C. Muñoz (Chile). Comparative analysis of wastewater technology and river environmental impact: Kraft pulp mills in South America (Chile and Uruguay). 14
12:00 - 14:00	Lunch	
	Sessions Fate and Effects Ecotoxicology of effluents and the receiving enviroment	Sessions IWA Internal control and system closure
14:00 - 14:30	5) C. Flinders, W. Streblow, D. Borton, J. Beebe, D. McLaughlin, E.Schilling, P. Wiegand (USA). Aquatic Biology Research for the Forest Products Industry: An Overview of Recent Studies and Future Directions. 83	1) M. N. Cabrera, L. Clavijo, M. Martikka, O. Dahl (Uruguay). Characterization of effluents from A-EP-DND and A-EP-D-P eucalyptus pulp bleaching sequences. 15

MA

	MONDAY, JANUAF	RY 9
	Sessions Fate and Effects Reproductive effects / Endocrine disruption	
14:30 - 15:00	1) A. Waye, J. Guerrero-Analco, A. Saleem, M. Taylor, J. Arnason, V. Trudeau (Canada). Pulp mill effluents <b>84</b> and pulp mill feedstocks as neuroendocrine disruptors.	2) M. Borges, C. Mudado, J. Colodette, R. Chaves de Oliveira (Brazil). Effects of xylanase application on Eucalyptus Kraft-O Pulp. 16
15:00 - 15:30	2) R. Orrego, J. Guchardi, D. Holdway (Canada). Embryotoxicity of Chilean pulp mill effluent extracts in Japanese medaka ( <i>Oryzias latipes</i> ). <b>85</b>	3) V. Da Re, L. Papinutti (Argentina). Decolorization of black liquor by 9 strains of lignocellulolytic basidiomycetes. 17
15:30 - 16:00	3) T. Arciszewski, K. Munkittrick (Canada). Comparing responses of sentinel fish species before and after the shutdown of a Kraft pulp mill in northern Ontario, Canada. 86	4) O. Pikka, M. Grötzner (Brazil). Water and wastewater management in modern bleached Eucalyptus Kraft pulp mill. 18
16:00 - 16:30	Coffe break	
16:30 - 17:30	Plenary 10 IWA and 8 Fate. Jukka Tana, Senior Consultant, Ei mill effluents — a historical overview, challenges and lesson	nergy & Environment, Finland. Monitoring of the impacts of pul s learned 5

	TUESDAY, JANUAR	Y 10
	Sessions Fate and Effects Effluent characterization / Toxicity Identification Evaluation	Sessions IWA Operation of treatment processes to minimize discharge and nutrient
08:30 - 09:00	1) R. Lewis, J. Van Leeuwen, A. Averson, C. Chow,     M. Jimenez (Australia). Investigation on color     formation from pre and post coagulation treatment of     Pinus radiata Sulfite pulp mill wastewater using     nutrient limited aerated baffled stabilization basin     treatment.  87	1) I. Horta, C. Mudado, C. Piacsek, V. Lopes (Brazil). Use granular aerobic sludge MBR (membrane bioreactor) to treat paper mill effluent. $$19$$
09:00 - 09:30	P. Scott, C. Milestone, S. Smith, D. MacLatchy,     M. Hewitt (Canada). Isolation and identification of ligands     for the goldfish testicular androgen receptor in chemical     recovery condensates from a Canadian bleached     kraft pulp and paper mill.	2) J. Liu, M. Paice (Canada). Filamentous bacteria identification and control strategies. 20

09:30 - 10:00	3) R. Duarte, A. Duarte (Portugal). Chromophoric compounds from an Eucalyptus bleached Kraft pulp mill effluent: new insights from comprehensive two-dimensional liquid chromatography. 89	3) S. Chakrabarti, S. Gupta, Methoxy, R. Vardhan (India). Controf bulking of sludge in activated sludge process treating pulp and paper mill effluent.
10:00 - 10:30	Coffee break	
10:00 - 17:30	Poster display	
	Sessions Fate and Effects Greenfield mills environmental impacts	Sessions IWA Operation of treatment processes to minimize discharge and nutrient
10:30 - 11:00	1) S. Nothrop, J. van Leeuwen, R. Dewi, A. Everson, C. Chow, E. Plant, R. Smernik (Australia). Characterization and removal of carbon, color, phosphorus, nitrogen and odor from magnesium bisulfite pulp mill wastewater for the remediation of a large coastal shallow freshwater lake. 90	4) X. Qu, W. Gao, A. Chen, B. Liao (Canada). Effect of hydraulic retention time on the performance and microbial community in a thermophilic aerobic membrane bioreactor. 22
	Sessions Fate and Effects Nutrient Encrichment	
11:00 - 11:30	M. Davies, M. Lebo, P. Pagoria, E. Mannisto (Canada).  Prediction of in-river responses to various phosphorus-reduction strategies at a Canadian Kraft pulp mill through development of a river-simulation model.  91	5) R. Cabrera–Padilla, P. Fernandes, E. Cleto (Brazil). Kinetics of aerobic thermophilic treatment of a kraft pulp bleach plant wastewater. 23
	Sessions Fate and Effects Invertebrate / Fish responses	
11:30 - 12:00	1) J. Parrott, M. Hewitt, T. Kovacs, D. MacLatchy, P. Martel, B. O'Connor, M.Van den Heuvel, G. Van Der Kraak, M. McMaster (Canada). Lab fish tests to assess the effects of pulp mill effluents. 92	6) T. Laukkanen, S. Toivakainen, H. Shahid, O. Dahl (Finland). Managing effluent phosphorus by optimizing the activated sludge process in ECF kraft pulp mill. 24
12:00 - 12:30	2) N. Ortiz, A. Elgueta, E. Habit (Chile). Dynamics of fish community structure from Itata river in a section with the influence of pulp mill effluent. 93	7) H. Shahid, S. Toivakainen, T. Laukkanen, O. Dahl (Finland). Applicability of biological phosphorus 25 removal process for kraft pulp mill wastewater treatment.
12:30 - 13:00	3) G. Chiang, K. Munkittrick, M. McMaster, R. Urrutia, C. Concha, R. Barra (Chile). Reproductive and metabolic responses of <i>Percillia gillissi</i> and <i>Trichomycterus areolatus</i> populations after 5 years of bleached kraft mill effluent discharge and discharge divertion to sea 94	8) M. Rissato, D. Botelho, A. Rodrigues, E. Foresti, E. Cleto (Brazil). Sulfidogenic anaerobic treatment to remove organic matter, sulfate and AOX from Kraft pulp mill wastewater 26
13:00 - 14:00	Lunch	

	TUESDAY, JANUAR	Y 10
	Sessions Fate and Effects Investigation of Causes	Sessions IWA Operation of treatment processes
14:00 - 14:30	4) R. Rutherford, P. Scott, C. Milestone, A. Lister, M. Hewitt, D. MacLatchy (Canada). Androgens and fifth effect evaporator condensates do not cause similar responses in mummichog ( <i>Fundulus heteroclitus</i> ). 95	9) M. Mokua, O. Orori, M. Mwamburi, K. Balozi, K. Senelwa, L. Etiégni (Kenya). Electrocoagulation of a paperboard mill wastewater using varying levels of tin oxide coating on aluminum electrodes. 27
	'	Sessions IWA Resource and energy recovery or conservation
14:30 - 15:00	5) K. Munkittrick, M. McMaster, L. Bowron, G. Tetreault, M. Hewitt (Canada). Investigation of impacts on white sucker ( <i>Catostomus commersoni</i> ) populations from Jackfish Bay to over 20 years of changes in pulp mill effluent discharges. 96	M. Vila, T. Mato, C. Kennes, M. Veiga (Spain).  Polyhydroxyalkanoates production from wood mill effluents.  28
15:00 - 15:30	6) P. Martel, T. Kovacs, B. O'Connor, M. Hewitt, D. MacLatch, M.McMaster, J.Parrott, M. van den Heuvel, G. Van Der Kraak (Canada). Progress status of a collaborative research project on the causes and solutions for effects on fish reproduction in Canada 97	2) M. Badshah, W. Parawira, B. Mattiasson (Sweden). Effect of hydrolysing paper and pulp fibre sludge with enzymes on biogas production in anaerobic batch reactors. 29
	Sessions Fate and Effects Monitoring Programs	
15:30 - 16:00	3) F. Niell, R. Carmona, M. Ruiz (Spain). The use of easy measurable variables in the sediment to assess impact in marine sediments affected by organic wastes (1978–2010) 98	3) M. Sandberg, A. Rixen (Sweden). Chemical flocculation as pretreatment for energy-efficient biological treatment. 30
16:00 - 16:30		4) T. Ericsson, Å. Sivard, H. Norrström (Sweden). Process integration of effluent treatment techniques — a way of decreasing the energy and resource use in pulp ar paper industries. 31
16:30 - 17:00	Coffee Break	
17:00 - 18:00	Plenary 10 IWA and 8 Fate. Karl Lorber, Institute for Sustaina Austria. Resourcemanagement in the forest industry. 6	ble Waste Management and Technology (IAE) University of L
20:00	Symposium dinner	
	WEDNESDAY, JAN	UARY 11
	Sessions Fate and Effects Monitoring Programs	Sessions IWA Fate and effect of specific compounds during wastewater treatment
08:30 - 09:00	1) J. Tana, F. Teixeira de Mello, I. Gonzalez, N. Vidal, A. D'Anatro, D. Larrea (Finland-Uruguay). Monitoring of fish community in the recipient of a greenfield pulp mill at River Uruguay during 2007–2010. 99	1) M. N. Cabrera, S. Toivakainen, M. Martikka, O. Dahl (Uruguay). Chlorate behaviour in Kraft pulp wastewater treatment systems. 32

	WEDNESDAY, JAN	UARY 11
09:00 - 09:30	2) M. McMaster, J. Parrott, M. Hewitt, T. Kovacs, D. MacLatchy, P. Martel, B. O'Connor, M. van den Heuvel, G. Van Der Kraak (Canada). The environmental effects monitoring program for the pulp and paper industry in Canada: national patterns resulting in IOC for reduced investment into reproduction.	2) C. Lucio da Silva, A. Mounteer, T.Duarte, S. Pereira, G. Mozer (Brazil). Organic load removal mechanisms in a eucalyptus bleached kraft pulp mill activated sludge plant. 33
09:30 - 10:00	3) R. Barra, G. Chiang (Chile). The monitoring requirements for assessing river impacts of pulp mill effluents in Chile: some recommendations. 101	3) G. Gielen, K. McGrouther, D. Gapes, T. Stuthridge (New Zealand). Towards understanding colour behaviour in pulp and paper mill wastewater treatment systems. 34
10:00 - 10:30	Coffee Break	
10:00 - 17:30	Poster Display	
	Sessions Fate and Effects Monitoring Programs	Sessions IWA Fate and effect of specific compounds during wastewater treatment
10:30 - 11:00	4) M. Salamanca, C. Chandia, A. Camaño (Chile). COP's spacetemporal distribution in sea water, marine sediments and marine organisms in the coastal platform off Itata river discharge area, Octava Region, Chile. 102	4) A. Klose, T. Hoffmann, E. Tiedtke (Germany). Influence of nonionic surfactants and biocides on the anaerobic stages of paper mill waste water treatment plants. 35
11:00 - 11:30	5) E. Hernández-Miranda, Á. Araneda, E. Díaz, R. Veas, K. Ibáñez, L. Lozano, R. Quiñones (Chile). Biodiversity of the coastal zone off the Itata river mouth after 5 years of effluents release from a pulp mill. 103	5) A. Cunha Lopes, A. Mounteer, T. Valverde (Brazil). Biological activity of bleached kraft pulp mill effluents before and after activated sludge and ozone treatments. 36
11:30 - 12:00	6) M. Dabezies, G. Ferrari, J. Clemente, L. Boccardi, C. Saizar (Uruguay). Biological baseline and monitoring of pulp mill activities at Uruguay river. 104	6) J. Fernandez, N. Diaz (Chile). Abatement of 4-chloropenol under visible light with peroxymonosulfate (PMS) in presence of Co2+. 37
12:00 - 13:00	Lunch	
	Sessions Fate and Effects River / Marine environment impacts	Sessions IWA Management of waste solids and their evaluation as by-products
13:00 - 13:30	1) R. Carmona, F. Niell, M. Ruiz, R. Sánchez de Pedro (Spain). A reassessment of Fucacean communities next to a cancelled waste in the Northwest of Spain. Effects of the improvement of the environmental protection technology.	1) A. Rezende, M. Diocaretz, J. Castañeda, M. Grandon, G. Vidal (Chile). Waste management: a review of the state of art of pulp and paper mills in South 38 America.
13:30 - 14:00	2) M. Gutiérrez, S. Pantoja, P. Ampuero, E. Tejos, R. Quiñones (Chile). Degradation capability of biopolymers in the coastal environment off central Chile (36.5 S). 106	2) V. Rodrigues, C. Mudado, A.Carneiro, A. Rezende, W. Quirino, L. Santos, G. Ikawa (Brazil). Co-firing of biological sludge and wooden residues from pulp mills for energy production. 39

	WEDNESDAY, JAN	UARY 11
14:00 - 14:30	3) L. Saavedra, R. Quiñones, J. Becerra (Chile). Phytosterols distribution in coastal and river sediments in central-southern Chile. 107	3) S. Guptaa, S. Chakrabarti, S. Singha (India). Minimisation of hazardous biosludge from pulp and paper industry by ozone oxidation. $40$
14:30 - 15:00	4) F. Niell, C. Casas, R. Carmona, M. Ruiz (Spain). More than fourty years of coevolution in a multiple 108 environmental system. Factories, cities and estuarine ecosystems. Is it possible a steady-state in the whole?	4) L. de Caux, L. Dalvi, M. Fonseca (Brazil). Investigation of thermal, physical and chemical characteristics of solid waste from cellulose pulp industry. 41
15:00 - 15:30	5) M. Karlsson, J. Malmaeus (Sweden). Declining levels of dioxins in sediment and fish in the receiving waters of two Swedish bleached kraft pulp mills. 109	5) A. Namazi, G. Allen, C. Jia (Canada). Microwave–assisted chemical activation of pulp mill sludge with potassium hydroxide for endocrine disrupting compounds removal. 42
15:30 - 16:00		6) F. Gallardo, M. Flores, M. Diez (Chile). Effects of the successive application of stabilized secondary sludge from the cellulose wastewater treatment plant to degraded chilean volcanic soils. 43
16:00 - 16:30	Coffee Break	
16:30 - 17:00	Plenary IWA. Claudio Zaror, Chemical Engineering Department, Engineering Faculty, University of Concepción, Chile. The forestry industry and the water issue. 7	
17:00 - 17:30	Plenary Fate and Effects. Renato Quiñones, Faculty of Natural and Oceanographic Sciences, University of Concepción, Chile. Pulp mill, stakeholders' participation and ecosystem research: the case of the PIMEX program. 8	

THURSDAY, JANUARY 12		
09:00	Technical visit	

# 10th IWA Symposium on Forest Industry Wastewaters **POSTERS (Auditorio Emprendo)**

### Life Cycle Assessment and ecological footprints (water and carbon footprint)

- 1.- S. Sanzana, C. Ulloa and D. Caamaño (Chile). NORSKE SKOG Biobío water management proposal based on a water footprint approach. 47
- 2.- P. González and M. Vega (Chile). Effect of Process Modifications on the Chilean Cellulose Water Footprint: A Life Cycle Perspective. 48

## Internal control and system closure

- 3.- C. Xavier, S. Vanzetto, M. Klenk, T. Oliveira de Melo and G. Pereira (Brazil). Qualitative and quantitative aspects consumption of water and wastewater generation in pulp and paper mill. 49
- 4.- C. Salazar, E. Soto, A. Vidal, H. Mansilla, R. Borquez, M. Mondaca, C. Peña and C. Zaror (Chile). Water recovery from eucalyptus kraft bleaching effluents using combined UF/RO membranes and electrooxidation. 50

### Operation of treatment processes to minimize discharge and nutrient

- 5.- S. Toivakainen, T. Laukkanen and O. Dahl (Finland). Dynamics in the aeration basin of the activated sludge process within ECF kraft pulp mills. 51
- 6.- M. Yeber and J. Novoa (Chile). Decolorization of kraft pulp ECF bleaching effluent using the photocatalytic system UV / k2S2O8 : Optimization by experimental design. 52
- 7.- M. Yeber and Silva. T (Chile). Ability of *Pseudomona aeruginosa* bacteria to degrade Kraft Lignin. 53
- 8.- E. Oñate, C. Salazar and C. Zaror (Chile). Performance assessment of membrane separation technologies to recover water and chemical resources from segregated ECF bleaching effluents in *Pinus radiata* kraft pulp production. 54
- 9.- M. Aqueveque, M. Cariñanco, G. Rivera, G. Pozo and G. Vidal (Chile). Evaluation of the bioaugmentation effect by a commercial-biological additives product for enhancing the performance of the biological paper mill wastewater treatment plant 55
- 10.- C. Muñoz, I. Vera, C. Plaza de los Reyes and Gladys Vidal (Chile). *Pinus radiata* and Eucalyptus globulus Wastewater Treatment from Sawmill Industry by Constructed Wetlands. 56
- 11.- A. Villamar, P. Aguayo, G. Pozo, K. Sáez, and G. Vidal (Chile). Statistical analysis on the performance of a moving bed bioreactor fed with *Eucalyptus globulus* kraft mill effluent 57
- 12.- O. Rubilar, G. Tortella, K. Romero, C. Bornhardt and M. C. Diez (Chile). Optimization of culture conditions for lignin degradation by *Anthracophyllum* discolor in an airlift bioreactor. 58
- 13.- F. Canales, F. Dibarrart and C. Muñoz (Chile). Application of a predictive model of pulp and paper mill effluent treatment plant control parameters by means of GOLDSIM model. 59

### Resource and energy recovery or conservation

- 14.- G. Pozo, A. Villamar, M. Martínez and G. Vidal (Chile). Polyhydroxyalkanoates (PHA) biosynthesis from kraft mill effluents in a moving bed bioreactor (MBBR): operational factors, biomass origin and nutrients effect. 60
- 15.- M. Mwamburi, M. Mutiso, O. Orori, K. Senelwa, B. Balozi and L. Etiégni (Kenia) Photovoltaic assisted electrocoagulation of a paperboard manufacture plant effluent using aluminum electrode and ash leachate. 61
- 16.- S. Montalvo, P. Madriaga, L. Guerrero (Chile). Conversion of an aerobic treatment plant of pull mill effluent to an anaerobic process saving energy and nutrients, with sludge production reduction and bioenergy production. 62
- 17.- M. Jarpa, R. Baeza, G. Pozo, M. Martínez and G. Vidal (Chile). Production of polyhydroxyalkanoates (PHA) by moving bed biofilm reactor (MBBR) treating a paper mill wastewater. 63

### Fate and effect of specific compounds during wastewater treatment

- 18.- S. Kumar, S. Chakrabarti and M. Sudhakara (India). Degradation of 2, 3, 4, 6 -Tetrachlorophenol by Pseudomonas sp. isolated from the sludge of pulp and paper industry 64
- 19.- M. Jarpa, C. Baeza and G. Vidal (Chile). Removal of recalcitrant organic compounds in pulp and paper effluents under advanced oxidation processes (AOPs): a review. 65
- 20.- L. Fernandes, S. Meyer, R. de Paula, C. Xavier (Brazil). Antibiotics effects on anaerobic biomass from kraft pulp mill effluent. 66
- 21.- M. Antunes, S. Pinto, F. Braga (Portugal). Removal of endocrine disruptors and pharmaceuticals compounds from water using forestry by-products as adsorbents. 67
- 22.- D. López, S. Chamorro, J. Silva, E. Bay-Schmith, G. Vidal (Chile). Chronic Effects of Pinus radiata and Eucalyptus globulus Kraft Mill Effluents and Phytosterols on *Daphnia magna*. 68
- 23.- L. Bascuñan , J. Fernandez (Chile). Photodegradation of dye remazol brilliant blue-r by HSO5- catalysed by Fe 2+ 69
- 24.- S. Chamorro , D. López , R. Baeza, A. Olivares , B. Piña and G. Vidal (Chile). Characteristic of the kraft mill effluents from *Pinus radiata* and *Eucalyptus globulus* by means combination of yeast bioassays and CG-MS chemical analysis. 70
- 25.- S. Elgueta, R. Cuevas, M. Campo, G. Cofre, M.C. Diez (Chile). Bioaugmentation with fungal pellet formulated with lignocellulosic waste to degrade liquid residue of atrazine in a biobed reactor. 71

### Management of waste solids and their evaluation as by-products

- 26.- M. Zambrano, R. Cuevas, A. Rojas, M. Alvear, M. Villarroel, G. Vidal (Chile). Grits effect in physical and chemical aspects in co:composting with kraft mill secondary sludge. 72
- 27.- M. Zambrano, C. Torres, A. Rojas, H. Leal, M. Alvear, M. Villarroel and G. Vidal (Chile). Biochemical parameters and toxicological characteristics of compost obtained from grits, biological sludge and bark coming from kraft mill solid wastes industry. 73
- 28.- C. Urrutia, Fernández. S and M.C Diez (Chile). Use of lignocellulosic wastes on biobed system to degrade pesticides. 74
- 29.- M. González, A. González, N. Sepúlveda, C. Toro, M. Cea, M.C. Diez, R. Navia (Chile). Characterization of biochars derived from agricultural and forestry residues 75

# 8th International Conference on the Fate and Effects of Pulp and Paper Mill Effluents **POSTERS (Auditorio Emprendo)**

### Ecotoxicology of effluents and the receiving environment

- 1.- M. Saavedra, G. Chiang and R. Barra (Chile). Point sources of impact on the Biobío River, Chile: Pulp and paper mill effluents and sewage treatment plant effluents, SIMILAR MAGNITUDE RESPONSES? 113
- 2.- E. Bay-Schmith, J. Silva, A. Cifuentes, C. Suárez and R. Urrutia (Chile). Ecotoxicity assessment of the industrial effluent from the Valdivia cellulose pulp mill and of its discharge receptor body (río Cruces). 114

### Fate modeling / Progress in bioactive chemicals characterization

3.- J. Malm, J. Mikael and M. Karlsson (Sweden). The development of a plume dispersion model for process water discharges. 115

### **Invertebrate / Fish responses**

- 4- A. Araneda, G. Chiang, A. Valenzuela and R. Barra (Chile). Qualitative characteristics of blood cells and evaluation of hematological parameters in Trichomycterus areolatus (Valenciennes, 1846) and *Percilia gillissi* (Girad, 1854) exposed to pulp mill effluent in the Itata River (Chile). 116
- 5.- M. Díaz, C. Verdugo, K. Ovalle, F. Correa and R. Figueroa (Chile). Pulp effluent effect on benthic macroinvertebrates community of central Chile. 117

### **Monitoring Programs**

- 6.- O. Parra, R. Figueroa, C. Valdovinos, E. Habit, H. Cid and C. Zaror (Chile). The environmental significance of forest industry effluents (Pulp and Papers mills) in the Biobío river basin. 118
- 7.- P. Torres, R. Jerez, S. Figueroa and D. Arcos (Chile). Short term coastal environmental monitoring of a local pulp mill plant treatment outfall. 119

### Nutrient enrichment

8.- O. Parra, H. Cid, D. Avilés (Chile). Monitoring of liquid waste pulp mill in a river water body. 120

### Proteomics, Genomics, Metabolomics

9.- E. Martínez, A. Llanos-Rivera, F. Cruzat. and R. González (Chile). Validation of glucose-6-phosphate dehidrogenase activity as a biomarker of environmental stress in larvae of *Danio rerio* (zebra fish). 121

### Reproductive effects / Endocrine disruption

- 10.- R. Orrego, C. Milestone, J. Guchardi, P. Scott, A. Waye, M. Kohli, B. O'Connor, B. Smith, H. Engelhardt, D. McLatchy, V. Trudeau, T. Kovacs, T. Heid-Furley, A. Slade, M. Hewitt and D. Holdway. A comparison of effluents and wood feedstocks from pulp and paper mills in Brazil, Canada and New Zealand and their ability to affect fish reproduction: Part II chemical profiling and fish bioassays. 122
- 11.- R. Mendoza, P. Pezo, G. Chiang, R. Barra and J. Gavilán (Chile). Effect Potential of hormonally active substances contained in pulp effluent, over gonadal mature of male fishes of *Trichomycterus areolatus* and *Percilia gillissi*. 123