Padmanav Routray

Principal Scientist

Mob-

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Department	Aquaculture Production & Environment
Institute/ University	Central Institute of Freshwater Aquaculture (*Indian Council of Agricultural Research*)
Address	Plot No-156, Station Square, Unit-3, Bhubaneswar-751001, Orissa.
Date of Birth	30th Oct 1968
Sex	Male
Tel	0674-2465446 ext-124
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Languages Known	Oriya, Hindi, English & Japanese

Academic Qualifications

Sl. No.	Name of the Degree	Name of the University	Percentage with Distinction	Year of Graduation
1	B. Sc (Zoology)	Orissa University of Agriculture & Technology, Bhubaneswar	72.8 % Honours in Zoology with Distinction. 1st Rank in University (OUAT, Bhubaneswar)	1989
2	M.Sc. (Fisheries Management)	University of Bombay, Mumbai	67.5 % 5th Rank in University of Bombay	1991

3	Ph. D Fisheries Science	Tokyo University of Fisheries, Tokyo, Japan	"Roles of different factors affecting the cryopreservation protocols of fish eggs and embryos"	2003
4	Ph. D Fisheries Science	Sambalpur University, Orissa	"Evaluation of cryopreserved milt of a selected carp, *Labeo calbasu* for fertilization and seed production"	2004
5	Diploma in "Marker Assisted Selection and Fish Breeding"	University of Chile, Santiago	Diploma Awarded	2009

Position and Assignments	a. Presently working as a **Senior Scientist** at Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar. Respossible for seed production and distribution to farming communities of India. b. **Nodal Scientist** for ICAR National Mega Seed Project (Carp seed including other fish seed) now being implemented in 37 Centres in India. c. Worked as **Consultant Scientist** to Government of Sri Lanka on "Fish Breeding and establishment of semen Cryobank at Dambulla, Srilanka". d. **Principal Investigator** of DBT funded project "Derivation and characterization of fish embryonic stem cells. Investigator" (Rs. 38.5 lakh) (2008-2011). e. **Principal Investigator** of NFDB, Hyderabad funded project "Quality seed production and stock upgradation of carps through use of cryopreservation technology in the selected hatcheries of India" (Rs. 27.86 lakh) (2009-2012). f. Worked as **FAO Consultant to Nepal** (Breeding and Hatchery Management) on Seed Sector Development during 2011 and 2012. g. Worked as **FAO Consultant to Bangladesh** on Broodstock upgadation, brood Banking and seed Sector development. Development during 2011 and 2012.

Number of Students Guided for Masters and Ph.D. (Masters 3, Ph.D. 4)	i. A.K. Chaudhary (2004), M.F. Sc. Thesis on "Cryopreservation of brain dead carp spermatozoa and their viability assessment", Central Institute of Fisheries Education, Mumbai. ii. A.N. Mishra (2005), M.F.Sc. Thesis on "Profiling of milt proteins of Indian major carp, *Labeo rohita* in cryopreservation process". Central Institute of Fisheries Education, Mumbai. iii. S.N. Dash (2007), Ph.D Thesis on "Characterization and cryopreservation of embryonic stem cells in fish", Utkal University, Bhubaneswar. iv. D. K. Verma (2007), Ph.D Thesis on "Cryogenic preservation of male gametes and functional efficacy of testis of *Cirrhinus mrigala* (Ham.), Central Institute of Fisheries Education (Deemed University), Mumbai. v. Sonti Lakshmi Lalita (2011). M. V. Sc. Thesis on "Use of stem cell therapy in clinical wound healing in animals". Orissa University of Agriculture and Technology, Bhubaneswar, Odisha. vi. Chidananda Dash (2012), Ph.D Thesis on "Optimization of methods for *in vitro* culture and cryopreservation of embryonic stem cells in Indian major carp, *Catla catla"*. Submitted to Utkal University, Bhubaneswar, Odisha. vii. Ranjan Kumar Sethi (2012), Masters in Biotechnology. Dissertaion entitled "Experimentally induced depletion of germ cells in sub-adult rohu, *Labeo rohita"*. Berhampur University, Berhampur, Odisha. **Number of PhDs Continuing- 3 Students**

Major scientific contributions (Major contributions to research/ teaching/ extension and impact on the sector thereof)	
Research	i. Establishment of carp hatcheries in many states of India. ii. Improvement of seed sector in fisheries under "National mega seed project" presently being implemented at 37 Centres in 20 states of India.

	iii. Utilization of cryo-milt in fish hatcheries and broodstock upgradation. iv. Transport of fish milt in cold chain and its utilization. v. First time reported off season breeding of Indian major carps during 2008 as a collaborator. vi. Developed methods to impregnate cryoprotective agents into the fish embryos. vii. Established the intracellular ice formation temperature (TIIF) and equilibrium melting point (Tm) in fish embryos. viii. Reported the live blastomeres in intact fish embryos after Cryopreservation of whole intact embryos. ix. Cryopreservation and utilization of carp gametes for seed production. x. Developed protocols for derivation and propagation of fish embryonic stem cells.
Teaching	i. Central Institute of Freshwater Aquaculture, BBSR has initiated Master Degree programme (M.F.Sc) in Freshwater Aquaculture in collaboration with the Central Institute of Fisheries Education, Mumbai. Being a faculty member of the programme, I am involved in teaching the course on Fish Breeding and Hatchery Management and cryopreservation of fish gametes. ii. Involved in Various national level training programmes in the field of carp breeding and carp culture at C. I. F. A., Bhubaneswar from 1994-1999. iii. Worked as a resource person for International training programme on “Carp breeding and hatchery management” sponsored by FAO and NACA at CIFA, Bhubaneswar. iv. Worked as a resource person for Japan International Cooperation Agency (JICA) training on “Fish gamete cryopreservation” at Tokyo University of Fisheries, Tokyo, Japan from year 2000 to 2003. v. A six month certificate course was conducted at CIFA. I was a Faculty for “Breeding and seed production of carps”.

Extension	
National	a. Involved in field extension and training of fisheries workers and fish farmers on different aspects of carp breeding and culture since 1994. b. Organized several exhibitions and farmers meet at different parts of the country as the head of the extension unit of CIFA (Additional Charge) during the year 1996-97. c. Involved in publication of training manual of carp breeding and culture and various extension pamphlets for extension activities at CIFA, BBSR. d. Provided technical know how on fish breeding, hatchery establishment and use of cryomilt to farmers of India. e. National training on "Cage and pen culture of fishes" (12-18, March 1997). f. National training on "Carp culture practices and potentials" (12-18, November, 1996). g. National training on "Multiple breeding and cryopreservation of carp milt" (4.7.05 to 11.4.2005). h. National training on "Genetic upgradation of cultivable carps" (5-13 August, 2003).
International	a. As a resource person trained the Japan International cooperative aency (JICA) trainees on "Cryopreservation of fish gametes". Trainees were the Fisheries Managers from ten different countries and the training programme was of one week. b. International Training programme on "Multiple breeding and cryopreservation of carp milt" (1-30 May, 1998). 1998 c. International Training programme on "Induced breeding and seed production of Indian major carps" (1-08-2004 to 02-09-2004). 2004 d. International Training programme on "Induced breeding and poly culture of Indian major carps" (14-08-2005 to 15-09-2005). 2005. e. Fish gamete cryopreservation and evaluation of the quality of stored sperm. In International training manual on "Short course on fish sperm quality evaluation and gamete cryopreservation" Japan International Cooperative Agency (JICA), pp. 13-17.2001 & 2002. f. International Training programme on "Induced breeding and poly culture of Indian major carps" (07-08-2006 to 09-09-2006).

	g. International Training programme on "Culture of freshwater finfish and shellfish" (4-09-2006 to 15-09-2006). h. International training programme on "Genetic improvement of cultivable carps through genetic and biotechnological methods" (10-01-2005 to 31-01-2005).

International Consultancy	
Consultant to Sri Lanka on Asynchronous Breeding and Establishment of Fish Semen Cryobank	Asynchronous breeding of fishes is a worldwide problem in many cultured fin fishes. In many hatcheries around the world, males mature first and after some time gap the females mature causing a mis-matching of spawning in brood fishes. This results in poor fertilization of eggs and economic loss to farmers. This has been reported from countries especially where two monsoon seasons prevail such as Sri Lanka. Cryopreservation of semen collected from these fishes at their prime maturity and utilization of the same can be an alternative to overcome the non-synchronization breeding. In this regard we offered consultancy after getting a request from Aquatic Resources Development and Quality Improvement Project, Ministry of Fisheries & Aquatic Resources, Sri Lanka to establish a fish semen cryobank.
Consultant to FAO of United Nations (TCDC Consultant) for seed Sector Development in Nepal.	Seed quality maintenance and improvement of breeding protocols for carps was undertaken by me during the seed sector development programme in Nepal during 2011 and 2012.
Consultant to FAO of United Nations (TCDC Consultant) for Broodstock upgradation, Seed Quality improvement in Bangladesh.	**Broodstock upgradation, Seed Quality improvement,** Seed quality maintenance and improvement of hatchery practices was undertaken by me during in Bangladesh during 2011 and 2012.

List of Publications

Research Papers

International (Peer Reviewed)

Padmanav Routray, Toru Suzuki, Norihito Kimizuka, Kiyoshi Kawai, Carlos Augusto Strüssmann and Rikuo Takai. Cold tolerance and ice nucleation temperature of medaka (*Oryzias latipes*) embryos with different cryoprotectant treatments. *Cryobiology and Cryotechnology*, vol.47, No.2, Page 1-6, 2001.

Padmanav Routray, Toru Suzuki, Carlos Augusto Strüssmann and Rikuo Takai.Factors affecting the uptake of DMSO by the eggs and embryos of medaka, Oryzias latipes. *Theriogenology*, 8667, Page 1-14, 2002.

Padmanav Routray, Toru Suzuki, Carlos Augusto Strüssmann and Rikuo Takai. Factors affecting the uptake of cryoprotective agents by fish eggs and embryos. *Fisheries Science*, 68, Page 965-966, 2002.

Padmanav Routray. "Roles of different factors on the cryopreservation protocols of fish eggs and embryos", Ph.D. *Thesis* submitted to Tokyo University of Fisheries, Konan, Minato-Ku, Tokyo, Japan, 2003.

P. Routray, A. K. Choudhury, S.N. Dash, P. Swain, J.K. Jena, S.D Gupta and N. Sarangi. (2006).Cryopreservation of dead fish spermatozoa several hours after death of Indian major carp, *Labeo rohita* (ham.) and its successful utilization in fish production. *Aquaculture*. 261:1204-1211.

Routray, P., D. K. Verma, S. Sarkar and N. Sarangi, 2007. Recent advances in carp seed production and milt cryopreservation. *Fish Physiology and Biochemistry*., 33: 413-427.

Nandi, S., **Routray, P**., Gupta, S. D., Rath, S. C., Dasgupta, S., Meher,P. K., Mukhopadhyay, P. K. reproductive performance of carp, Catla catla (Ham.), reared on a formulated diet with PUFA supplementation. *Journal of Applied Ichthyology*., 23:684-691, 2007.

Routray, Padmanav., Dash, Surjya Narayan., Dash, Chidananda., Swain, Priyabrat., Sarkar, Sampad Kumar and Sarangi, Niranjan. (2008). Cryopreservation of silver barb *Puntius gonionotus* (Bleeker) spermatozoa: effect of extender composition, cryoprotective agents and freezing rate on their

postthawing fertilization ability. *Aquaculture Research*, 39: 1597-1605.

P. Swain, S. Dash, J. Bal, P. K. Sahoo, **P. Routray**, S. K. Sahoo and S. D. Gupta (2006). Passive transfer of maternal antibodies and their existence in eggs, spawn and fry of Indian major carp (*Labeo rohita*, Ham.). *Fish and Shellfish Immunology*. 20:519-527.

P. Swain, S. Dash, J. Bal, P. K. Sahoo, **P. Routray**, S. K. Sahoo and S. D. Gupta. (2007) Non-specific immune parameters of brood Indian major carp *Labeo rohita* and their seasonal variations. *Fish and Shellfish Immunology*, 22: 38-43.

Dash, S. N., **Routray, P.**, Dash, C., Guru, B.C., Swain, P. and Sarangi, N. (2008). Use of the non toxic cryoprotectant trehalose enhances recovery and function of fish embryonic stem cells following cryogenic storage. *Current Stem Cell Research & Therapy*, (3), 277-287.

Nanda, P. K., Swain, P., Nayak, S. K., Dash, S., **Routray P.**, Swain, S. K., Patra, B. C. (2009). Goat serum as an alternative to establish cell culture from Indian major carp, *Cirrhinus mrigala*. *In Vitro Cell Dev Biol-Animal*. 45:148–151.

Verma, D. K. **Routray, P.**, Dash, C., Dasgupta, S., Jena, J. K. (2009). Physical and biochemical characteristics of semen and ultrastructure of spermatozoa in six carp species *Turkish Journal of Fisheries and Aquatic Sciences* 9: 67-76.

Verma, D. K. **Routray, P.**, Nanda, P. K.., Sarangi, N. (2009). Seasonal variation in semen characteristics and biochemical composition of seminal plasma of mrigal, *Cirrhinus mrigala* (Ham.). *Asian Fisheries Science* 22: 429-443.

Dash, Nihar Ranjan., Dash, Surjya Narayan., **Routray, Padmanav**., Mohapatra, Sribatsha., Mohapatra, Prakash C. (2009) *Rejuvenation Research*. O12(5): 359-366. doi:10.1089/rej.2009.0872.

Routray, Padmanav., Dash, Chidananda., Dash, Surjya Narayan., Tripathy, Seema., Verma, Dhananjay Kumar., Swain, Saroj Kumar., Swain, Priyabrat., Guru, Bhikari Charan. (2009). Cryopreservation of isolated blastomeres and embryonic stem-like cells of Leopard danio, Brachydanio frankei. *Aquaculture Research*, 2009, 1-12 doi:10.1111/j.1365-2109.2009.02456.x.

Behera, T., Nanda, P.K., Mohanty, C., Mohapatra, D., Swain, P., Das, B.K., **Routray, P.**, Mishra, B.K., Sahoo, S.K. (2009).

	Parenteral immunization of fish, Labeo rohita with Poly D, L-Lactide-co-glycolic acid (PLGA) encapsulated antigen microparticles promotes innate and adaptive immune responses. *Fish and Shellfish Immunology*, 1-6, doi: 10.1016/j.fsi.2009.11.009. Dash, C., **Routray, P.**, Tripathy, S., Verma, D. K., Meher, P. K., Nandi, S., Guru, B. C., Eknath, A. E. (2010). Derivation and characterization of embryonic stem-like cells of Indian major carp Catla catla. *Journal of Fish Biology* 77, 1096–1113. Verma, D. K., **Routray, P**., Sahu, A. D., and Rath, S. C. (2010). Qualitative and quantitative changes in testes of Cirrhinus mrigala (Ham.) through multiple induced stripping. *Indian Journal of Animal Sciences* 80 (11), 1157–59. Sarkar, S.K., Saha, A., Dasgupta, S., Nandi, S., Verma, D. K., **Routray, P**., Devaraj, C., Mohanty, J., Sarangi, N., Eknath, A. E., Ayyappan, S. (2010). Photo-thermal manipulation of reproduction in Indian major carp: A step forward for off-season breeding and seed production. *Current Science*, 99 (7), 960-964. Swain, B., Basu, M., Sahoo, B.R., Maiti, N.K., **Routray, P**., Eknath, A. E., Samanta, M. (2011). Molecular characterization of nucleotide binding and oligomerization domain (NOD)-2, analysis of its inductive expression and down-stream signaling following ligands exposure and bacterial infection in rohu (*Labeo rohita*). *Developmental and Comparative Immunology* 36 (2012) 93–103. Basu, M., Swain, B., Maiti, N.K., Routray, P., Samanta, M. (2011). Inductive expression of toll-like receptor 5 (TLR5) and associated downstream signaling molecules following ligand exposure and bacterial infection in the Indian major carp, mrigal (*Cirrhinus mrigala*). *Fish and Shellfish Immunology*, Ahead of Print.
National	Dash, C., **Routray, P**., Dash, S. N., Swain, P., Verma, D. K., and Nanda, P. K. (2009). Localization of primordial germ cells (PGCs) in different developmental stages of Labeo rohita (Ham.). *Indian Journal of Animal Sciences.* 79 (6): 645-649, Dash, N. R., Dash, S.N., **Routray, P**., Mohapatra, S. K., Mohapatra, P. C., (2007). Therapeutic application of autologous bone marrow derived mononuclear cells in non-healing ulcers of lower extremities, *Indian Journal of Clinical Biochemistry*,

	(supl), 5.9. Aravindakshan, P. K., Jena, J. K., Ayyappan, S., **Routray, P**., Muduli, H. K., Suresh Chandra and Tripathi, S. D. (1999). Evaluation of production trials with grass carp as a major component in carp polyculture, ***J. Inland Fish. Soc.***, India. 31(1), Page 64-68. Dash C, Tripathy S, Verma D K, Meher P K, Swain S K., **Routray P** and Guru B C (2008). Existence and derivation of embryonic stem like cells in Indian major carp, *Catla catla*. *e-plane*t. 6 (2) 07-11. Dash S N, **Routray P**, Guru B C, Dash C and Sarangi N (2008). Mode of cell death in fish embryonic stem cells following cryogenic storage. *The Bioscan*. 3(1) 09-15. **Routray, P.** and Routray, M. D. (1997). Growth potential of grass carp, *Ctenopharyngodon idella*, val. in saline water with an aquatic weed *Potamogeton pectinatus* as feed. *Fishery Technology*, 34(2), 7-10. **Routray, P.** and Routray, M. D. (1998). Culture possibilities of grass carp, Ctenopharyngodon idella, val. in pens of low saline brackishwater areas of chilka lake. *J. Aquaculture*, (6), 13-17. Chakraborty, N. M., Kumaraiah., P.,and **Routray, P.** (1999). Occurrence of fish diseases in tanks and ponds of Karnataka state. *J. Aquacultur**e***, (7), 51-54. Routray, P. and Mohanty, S., (2001). Bio-suppression of microorganisms through control of gastropod (Atlanta sp.) by the puffer fish, tetrodon cutcutia (Ham-Buchanan). *Environment and Ecology*. 19 (2):365-368 **Padmanav Routray**. (2003). "Evaluation of cryopreserved milt of a selected carp, Labeo calbasu for fertilization and seed production", Ph.D. *Thesis* submitted to Sambalpur University, Jyoti Vihar, Sambalpur, Orissa, India, 2003.

Books/ Book Chapters	Gupta, S. D., B. C. Mohapatra., **P. Routray**., S. K. Sahoo., D. K. Verma, Sarangi, N., (2008). Text Book of Breeding and Hatchery Management of Carps. Narandra Publishing House, New Delhi. (ISBN 81-85375-97-6).169p. **Routray, Padmanav**, Samanta, R. K., and Prasad, M. V. (1994) Fisheries Co-operatives: A vista for rural development in India. In "Rural Economy and Development Planning for the Future

(Book). Oxford IBH, NewDelhi. 115-123.

Routray, P., S. Dasgupta and S. K. Sarkar. (2007). Cryoconservation of fish gametes and embryonic cells. In: *Environmental Biotechnology*. (C. S. K. Mishra and Asha A. Juwarkar, eds) APH Publishing Corporation, Delhi. (ISBN 81-313-0185-0). pp. 351-368.

Routray, P. (2007). Cryoconservation of germplasm of fishes and their database management. In: *Bioinformatics and Statistics in Fisheries Research* (A. K.Roy and N. Sarangi eds.) Vol III. 216-222. (ISBN: 978-81-904422-0-6). Pp. 216-222.

Routray, P. (2008). Artificial propagation and cryoconservation of fishes. In: *Applied Bioinformatics* (A. K.Roy and N. Sarangi eds.) Vol III.216-222. (ISBN: 978-81-904422-0-6). Pp. 216-222.

P. Routray, S.N. Dash and Swain, P. (2005). Climate change and its impact on fisheries. *In* C. S. K. Mishra, J. W. Kim and A. Saxena (eds) Environmental issues and options. Daya publishing house, Delhi **(ISBN 81-7035-431-5).**

Routray, P. Dasgupta, S. and Sarkar, S. K. (2007). Cryoconservation of fish gametes and embryonic cells. *In* "Environmental Biotechnology". *In* C. S. K. Mishra and Asha A. Juwarkar (Eds) APH Publishing Corporation, Delhi. Pp. 351-368 (**ISBN 81-313-0185-0).**

Dash, S. N., Mishra, C.S.K., Guru, B. C., and **Routray**, **P.** (2007). Transgenic fish as models for environmental toxicology and biomedical research. *In* "Environmental Biotechnology". *In* C. S. K. Mishra and Asha A. Juwarkar (Eds) APH Publishing Corporation, Delhi. Pp. 329-350 (**ISBN 81-313-0185-0).**

Swain, Saroj K., Malik, Divya., Mishra, Snehashish., Sarkar, Biplab and **Routray**, **P.** (2007). Ornamental fish as model animals for biotechnological research. *In* "Environmental Biotechnology". *In* C. S. K. Mishra and Asha A. Juwarkar (Eds) APH Publishing Corporation, Delhi. Pp. 329-350 (**ISBN 81-313-0185-0).**

Popular Science/ Articles	
	Routray, P., Kumaraiah, P., and Chakraborty, N. M. Some aspects of fishery, biology and conservation of a peninsular carp, *Puntius pulchellus* (Day). *Fishing Chimes*, 21 (5), 53-55, 2001. **Routray P**, Dash, S N, Swain P, Dash C and Gupta S D (2006). Potential use of Primordial germ cells in aquaculture biotechnology. *Fishing Chimes.* 26 (7) 47-49. **Routray,** P., Gupta, S. D., and Behera, M. K. Cryogenics in fish hatchery technology. *Fishing Chimes*, 1-6, June, 2003. **Routray, P**., Venkatesan, T., and Kumaraiah, P. Biological control: A perspective for Aquaculture development. *Fishing Chimes*, 17 (12), 39-42, 1998. **Routray, P.** Export augmentation through fishery estates and FADs. *Seafood Export Journal*, 29-33, 2001. **Routray, P.**, S. D. Gupta, N. Sarangi. 2007. Induced multiple spawning of carps for higher seed production. *Indian Farming*. 56(10), 13-15. Verma, D. K., **P. Routray**, S. Dasgupta and N. Sarangi, 2007. Cryoinjury in fish spermatozoa, *Fishing Chimes*, 27 (8), 37- 42. **P. Routray** and S. D. Gupta (2006). Techniques of cryopreservation of carp spermatozoa. *In* Training manual on Recent advances in freshwater aquaculture, pp. 90-95. **P. Routray** (2006). Advances in the seed production technology of major carps. *In* International training manual on "Culture of freshwater finfish and shellfish" recent advances in freshwater aquaculture, pp. 13-17. **P. Routray** (2001). Fish gamete cryopreservation and evaluation of the quality of stored sperm. *In* International training manual on "Short course on fish sperm quality evaluation and gamete cryopreservation" Japan International Cooperative Agency (JICA), pp. 13-17. **P. Routray** and S.D. Gupta (2004). Carp breeding and hatchery mangement. *In* CIFA Technologies, pp. 1-4. **P. Routray** and S.D. Gupta (2004). Cryopreservation of carp milt. *In* CIFA Technologies, pp. 19-21. Pramoda Kumar Nanada and **Padmanav Routray** (2006). Pesticide residues in Aquaculture products and methods of detection.

	Aqua International. September: 34-36. Pramoda Kumar Nanada and **Padmanav Routray** (2006). Bacterial pathogens from aquaculture produces and associated public health issues. Aqua International. October: 18-20. Tripathy, S., Dash, C., Routray, P. (2009). Stem Cells: A Novelty in Biological Research. Emerging Science. Vol.1, No.6, 30-35.
Oriya	i) **Routray, P.** (2005). Carp jatiya machhara jaanla utpadana O Maa machara jatnna. Mastya O Ama Bikasha.1 (1): 29-31. ii) C. Dash and **Routray, P.** (2006). Himikruta sukranu O macha chasare ehara byabaharita. Mastya O Ama Bikasha 1(3): 18-20.
Hindi	D.K.Verma and P.Routray, 2008. Utprerit karp prajnan se mahilaon mein udhmata ki sambhavnaye. Kshetriya vaigyanik sanghosti on Krishirat Mahilaon mein Udhamata ka Vikas. NRCWA, Bhubaneswar, Orissa. Abstract –page 10.

Popularization of Science	
Doordarshan programmes	i. Doordarshan coverage of Utilization of carp milt for stock upgradation (Oriya programme "Pallishree" by Doordarshan Kendra, Bhubaneswar on 23. 1. 2004. ii. Doordarshan programme on "Brood fish care and seed production" in National programme on DD-1 (Krishi Darshan-consecutive five episodes for 5days), by Doordarshan Kendra, Bhubaneswar from 8-12 August, 2005. iii. Doordarshan programme on "Spent brood fish care" in National programme on DD-1 (Krishi Darshan-consecutive five episodes for 5 days), by Doordarshan Kendra, Bhubaneswar on 13. 10. 2006. iv. Made a popular v Televison documentary on "Carp breeding and culture" for unemployed youth was done. The title of the programme was "Satahela Sapana". It was done in a dramatized manner. This programme was undertaken made by ORSSAC, Govt. of Orissa with technical and operational assistance by me and telecasted during June, 2008 in National TV (Oriya).

Radio talks	i. Delivered four Radio talks on AIR, Cuttack on different aspects of fish breeding, transgenic fish, and brood fish care during 2004-05

Participation in Seminar/ Symposia/ Workshop/ Conference etc. (Overseas Only)

Sl. No.	Name of the seminar / symposia / workshop / conference	Name of the organization
1	Japanese language course	Tokyo Institute of Technology, Japan
2	International conference on Fisheries Science, Yokohama City, Japan.	Japanese Society for Fisheries Science, 2002
3	International conference on "Cryobiology", Breckenridge, USA.	37th meeting of the Society for Cryobiologists, USA, July 27-31, 2002
4	Seminar on "Fisheries Science"	Kinki University, Nara, Japan, 2002
5	Seminar on "Cryobiology and Cryotechnology"	Cryobiology and Cryotechnology society of Japan, 1-2 June 2001, University of Agriculture, Tokyo
6	International Conference on "Salmon Genome" held at Santiago, Chile from 16-17 April 2009.	Government of Chile, Canada and Norway
7	Short term course and workshop on "Human embryonic stem cell culture techniques" at (05-09 Feb, 2007).	Reliance School of Life Sciences, Mumbai
8	Training Course on "Basic Techniques in Stem Cell Biology: Isolation, Maintenance and Differentiation" 25 February-10, March 2008.	Centre for Cellular and Molecular Biology, Hyderabad, India.

Association with Professional Bodies	• Life Member of Association of Aquaculturists, CIFA, Bhubaneswar. • Life Member of Organization for Protection of Ecosystem, Environment and Endangered Species (OPES), Bhubaneswar.

	• Member, Bharat Krushak Samaj • Life Member, Society for Fishery Technologists, CIFT, Cochin.
Awards/ Fellowships/ Recognitions	• **First rank in Orissa University of Agriculture and Technology**, Bhubaneswar in Bachelor of Science in Zoology with Distinction. • **State Government Merit Scholarship** for Higher Education (Post Graduate Studies). • **Japanese Government Scholarship** (MONBUSHO) for higher studies for the session 2000 by the Ministry of Sports, Science and Culture, Govt. of Japan. • **STA (Student Travel Award)-2002** by the Society for Cryobiologists, USA. Received a cash award of 900USD. • **Outstanding Team Research Award** for the Biennium 2003 – 2004 from Indian Council of Agricultural Research (ICAR), New Delhi for contribution towards improved brood stock management protocols and cryopreservation. • **Best Young Scientist Award** for the year 2006 from Dr Hiralal Chaudhuri Fisheries Foundation, Central Institute of Fisheries Education (Deemed University), Mumbai. • **Best Young Scientist Award** for the year 2006 from CIFA, Bhubaneswar. • **Best Poster Presentation Award and Best Popular Poster Award**: S. Tripathy, C. Dash, D. K. Verma and P. Routray for paper entitled "Stage dependent derivation of fish embryonic stem (ES) like cells"in the Fish Genetic, Nutrition and Biotechnology category at the 8th Indian Fisheries Forum, Kolkata.held during November 22-26, 2008. • **Best Oral Presentation Award**: A. K. Choudhary, P. Routray, S. D. Gupta, J. K. Jena (2004). Effect of D-Glucose on the post thawed motility of spermatozoa and its fertilization efficiency. Accepted for oral presentation at "National Seminar on responsible Fisheries" (12-13, Feb, 2004) held at College of Fisheries, Rangailunda, Berhampur, orissa. • **Scroll of Honour** received from National Aquaculture Development Authority (NAQDA), Ministry of Fisheries & Aquatic Resources, Colombo of Sri Lanka for contributions to the development of freshwater aquaculture, fisheries and establishment of fish semen cryobank at Aquaculture

	Development Centre, Dambulla, Sri Lanka. • **ICAR Outstanding Team Research Award for the Biennium** 2007–2008 for "Outstanding Interdisciplinary Team Research" towards development of methods for "Off-season maturation and spawning of Indian major carps." • **Yang Yi Memorial Abstract Award from World Aquaculture Society** (WAS) for the paper Cryopreservation of Fish Embryonic Stem Cells with Carbohydrate Additives by C. Dash, P. Routray, S. Tripathy, D. K. Verma, A.D. Sahu, B. C. Guru, P.K.Meher at the Asia Pacific Aquaculture – 2011, 17- 20th Jan, 2011. • **Best Poster Award from World Aquaculture Society (WAS)** for the paper on Factors affecting in-vitro differentiation of Indian major carp embryonic stem (ES) cells by S. Tripathy, P. Routray, C. Dash, D. K. Verma, S. K. Swain, P. Sahu, G.K.Purohit at the Asia Pacific Aquaculture – 2011, 17- 20th Jan, 2011. • **Krushak Bandhu Award- 2011** received from Odisha Krushak Samaj for outstanding contribution to the development of farming communities in Odisha.
Contribution to the Farming Community	The back bone of freshwater aquaculture industry in our country is highly dependent on quality carp seed. Indian major carps are the major contributors to the total Inland fish production. As a I am working for the seed production of these carps, it is our pleasure to provide technical know how for seed production, hatchery establishment, improved brood stock management, use of cryopreserved semen of improved and elite brood fish to farming communities all over India. Some of the the salient features of my contribution are: i. **Establishment of hatcheries** in different states of India. Provided technical know how and helped the farmers of Orissa at many places for establishment of carp hatchery at Kendrapara, Jagatsinghpur, Puri, Dhenkanal and Khurda. Beside this provided scientific know how on utilization of carp semen and establishment of carp hatcheries to states like Andhra Pradesh, Tamilnadu, Punjab, Madhya Pradesh and Orissa. ii. As a Nodal Officer for implementation of National Mega Seed Project contributed in establishment of carp hatcheries and provided technical know how for establishment as well as for operation at 22 places of India.

	iii. AT CIFA we produce quality seed of Catla, Rohu, Mrigal and other carps for supply to fish farmers of Orissa. Seed production and distribution including the training of Farmers is an integral part of our research. iv. More than 500 fish farmers are directly involved in the seed raising and are in the registered list of ours. The indirect involvements of many others in the farming communities are also noteworthy. v. Every Year we produce 50 million carp seed and distribute to Fish farmers mostly from Orissa.

Patents and Products Developed	
Patents: (3 nos)	i) "A manually operated low cost handy cryofreezer for gamete cryopreservation" No.1123/DEL/2005 dated 4. 5. 2005. ii) "Male-specific protein of Indian major carp (*Labeo rohita* Ham.) – A key for sex differentiation and brood stock management. Patent No. 1116/DEL/2005 dated 4/05/2005. iii) "A method and an apparatus for developing gonadal maturity in carp" Patent No. 1689/DEL/2008 dated 14/07/2008. iv) The trade Mark for this (CIFABROOD) has been filed in the class 31 in the name of CIFA, Bhubaneswar at the Trade Marks Registry on 4th March 2009 by the Institute's agent M/S L. S. Davar & Co, Kolkatta vide their communication Fascimile No.. 009167465407.
Products: (3 nos)	i) Immunoboost-C for better brood stock health and seed production of carps. Commercialized to Star Aqualab, Banshichak, Thakurchak, West Medinipore, West Bengal-721424. ii) A manually operated low cost handy cryofreezer for gamete cryopreservation in fish. (Under commercialization Process) iii) **"**CIFA Brood**"** A formulated diet for carp brood fish was released by Honorable DDG (Fy.), ICAR, New Delhi on 7th June 2008.